CHAPTER 13

Organisms and Populations

13.1 Organism and Its Environment

1. Niche is
(a) all the biological factors in the organism's environment
(b) the physical space where an organism lives
(c) the range of temperature that the organism needs to live
(d) the functional role played by the organism where it lives. *(NEET 2018)*

2. Pneumatophores occur in
(a) halophytes
(b) free-floating hydrophytes
(c) carnivorous plants
(d) submerged hydrophytes. *(NEET 2018)*

3. Plants which produce characteristic pneumatophores and show vivipary belong to
(a) halophytes (b) psammophytes
(c) hydrophytes (d) mesophytes.
(NEET 2017)

4. Presence of plants arranged into well defined vertical layers depending on their height can be seen best in
(a) tropical rainforest (b) grassland
(c) temperate forest (d) tropical savannah.
(NEET 2017)

5. It is much easier for a small animal to run uphill than for a large animal, because
(a) small animals have a lower O_2 requirement
(b) the efficiency of muscles in large animals is less than in the small animals
(c) it is easier to carry a small body weight
(d) smaller animals have a higher metabolic rate.
(NEET-I 2016)

6. An association of individuals of different species living in the same habitat and having functional interactions is
(a) ecosystem (b) population
(c) ecological niche (d) biotic community.
(2015)

7. Most animals are tree dwellers in a
(a) temperate deciduous forest
(b) tropical rainforest
(c) coniferous forest
(d) thorn woodland. *(2015 Cancelled)*

8. Just as a person moving from Delhi to Shimla to escape the heat for the duration of hot summer, thousands of migratory birds from Siberia and other extremely cold northern regions move to
(a) Western Ghat
(b) Meghalaya
(c) Corbett National Park
(d) Keoladeo National Park. *(2014)*

9. Which one of the following is not a parasitic adaptation?
(a) Development of adhesive organs
(b) Loss of digestive organs
(c) Loss of reproductive capacity
(d) Loss of unnecessary sense organs
(Karnataka NEET 2013)

10. Benthic organisms are affected the most by
(a) light reaching the forest floor
(b) surface turbulence of water
(c) sediment characteristics of aquatic ecosystems
(d) water-holding capacity of soil.
(Karnataka NEET 2013)

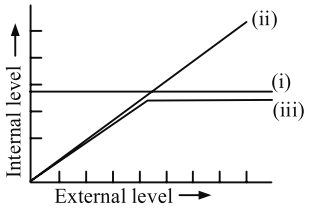
11. People who have migrated from the planes to an area adjoining Rohtang Pass about six months back
(a) have more RBCs and their haemoglobin has a lower binding affinity to O_2
(b) are not physically fit to play games like football
(c) suffer from altitude sickness with symptoms like nausea, fatigue, etc.
(d) have the usual RBC count but their haemoglobin has very high binding affinity to O_2. *(2012)*

12. Large woody vines are more commonly found in
(a) temperate forests (b) mangroves
(c) tropical rainforests (d) alpine forests. *(2011)*

13. Consider the following four conditions (1 - 4) and select a correct pair of them as adaptations to environment in desert lizards.
Conditions:
1. Burrowing in soil to escape high temperature.
2. Losing heat rapidly from the body during high temperature.
3. Bask in sun when temperature is low.
4. Insulating body due to thick fatty dermis.

(a) 3, 4 (b) 1, 3
(c) 2, 4 (d) 1, 2 *(2011)*

14. The figure given below is a diagrammatic representation of response of organisms to abiotic factors. What do (i), (ii) and (iii) represent respectively?



	(i)	(ii)	(iii)
(a)	Conformer	Regulator	Partial regulator
(b)	Regulator	Partial regulator	Conformer
(c)	Partial regulator	Regulator	Conformer
(d)	Regulator	Conformer	Partial regulator

(2010)

15. Reduction in vascular tissue, mechanical tissue and cuticle is characteristic of
(a) mesophytes (b) epiphytes
(c) hydrophytes (d) xerophytes. *(2009)*

16. Consider the following four statements (1-4) about certain desert animals such as kangaroo, rat.
(1) They have dark colour and high rate of reproduction and excrete solid urine.
(2) They do not drink water, breathe at a slow rate to conserve water and have their body covered with thick hairs.
(3) They feed on dry seeds and do not require drinking water.
(4) They excrete very concentrated urine and do not use water to regulate body temperature.
Which two of the above statements for such animals are true?
(a) 3 and 1 (b) 1 and 2
(c) 3 and 4 (d) 2 and 3 *(2008)*

17. *Quercus* species are the dominant component in
(a) scrub forests
(b) tropical rainforests
(c) temperate deciduous forests
(d) alpine forests. *(2008)*

18. Niche overlap indicates
(a) mutualism between two species
(b) active cooperation between two species
(c) two different parasites on the same host
(d) sharing of one or more resources between the two species. *(2006)*

19. People living at sea level have around 5 million RBC per cubic millimeter of their blood whereas those living at an altitude to 5400 metres have around 8 million. This is because at high altitude
(a) people eat more nutritive food, therefore more RBCs are formed
(b) people get pollution-free air to breath and more oxygen is available
(c) atmospheric O_2 level is less and hence more RBCs are needed to absorb the required amount of O_2 to survive
(d) there is more UV radiation which enhances RBC production. *(2006)*

20. Annual migration does not occur in the case of
(a) arctic tern (b) salmon
(c) siberian crane (d) salamander. *(2006)*

21. Praying mantis is a good example of
(a) camouflage
(b) mullerian mimicry
(c) warning colouration
(d) social insects. *(2006)*

22. More than 70% of world's freshwater is contained in
(a) polar ice
(b) glaciers and mountains
(c) Antarctica
(d) Greenland. *(2005)*

23. At which latitude, heat gain through insolation approximately equals heat loss through terrestrial radiation?
(a) $22\frac{1}{2}°$ North and South
(b) 40° North and South
(c) $42\frac{1}{2}°$ North and South
(d) 66° North and South *(2005)*

24. Animals have the innate ability to escape from predation. Examples for the same are given below. Select the incorrect example.
(a) Colour change in Chamaeleon
(b) Enlargement of body size by swallowing air in puffer fish
(c) Poison fangs in snakes
(d) Melanism in moths *(2005)*

25. Which one of the following pairs is mismatched?
(a) Tundra – Permafrost
(b) Savanna – *Acacia* trees
(c) Prairie – Epiphytes
(d) Coniferous forest – Evergreen trees *(2005)*

26. In which one of the following pairs is the specific characteristic of a soil not correctly matched?
(a) Laterite – Contains aluminium compound
(b) Terra rosa – Most suitable for roses
(c) Chernozems – Richest soil in the world
(d) Black soil – Rich in calcium carbonate *(2004)*

27. In which one of the following habitats does the diurnal temperature of soil surface vary most?
(a) Shrub land (b) Forest
(c) Desert (d) Grassland *(2004)*

28. What is true for individuals of same species?
(a) Live in same niche
(b) Live in same habitat
(c) Interbreeding
(d) Live in different habitat *(2002)*

29. Cause of mimicry is
(a) concealment (b) offence
(c) defence (d) both (b) and (c). *(2002)*

30. Which part of the world has a high density of organisms?
(a) Deciduous forests (b) Tropical rainforests
(c) Grasslands (d) Savannah *(1999)*

31. In desert grasslands, which type of animals are relatively more abundant?
(a) Aquatic (b) Fossorial
(c) Diurnal (d) Arboreal *(1998)*

32. Plants such as *Prosopis*, *Acacia* and *Capparis* represent examples of tropical
(a) deciduous forests (b) evergreen forests
(c) grasslands (d) thorn forests. *(1998)*

33. Which of the following communities is more vulnerable to invasion by outside animals and plants?
(a) Temperate forests
(b) Oceanic island communities
(c) Mangroves
(d) Tropical evergreen forests *(1998)*

34. During adverse season, therophytes survive by
(a) rhizomes (b) seeds
(c) bulbs (d) corms *(1997)*

35. Benthoic animals are those, which
(a) are submerged in area
(b) float on the sea surface
(c) are deep dweller in sea
(d) are floating (free) organisms. *(1996)*

36. The 'niche' of a species is meant for
(a) habitat and specific functions of a species
(b) specific place where an organism lives
(c) specific species function and its competitive power
(d) none of these. *(1996)*

37. The animals of cold countries have relatively shorter and poorly developed ears, eyes, hairs and other phenotypic characters. This is known by which law?
(a) Cope's Law (b) Dollo's Law
(c) Allen's Law (d) Bergamann's Law *(1996)*

38. Study of inter-relationships between organisms and their environment is
(a) ecology (b) ecosystem
(c) phytogeography (d) ethology. *(1993)*

39. The sum total of the populations of the same kind of organisms constitute
(a) colony (b) genus
(c) community (d) species. *(1993)*

40. Fertility of soil is measured by its ability to
(a) retain nutrients
(b) hold organic materials
(c) hold water
(d) support life. *(1992)*

41. Soil particles determine its
(a) texture
(b) field capacity
(c) water holding capacity
(d) soil flora. *(1992)*

42. Homeostasis is
(a) tendency of biological systems to change with change in environment
(b) tendency of biological systems to resist change
(c) disturbance of self regulatory system and natural controls
(d) biotic materials used in homeopathic medicines. *(1991)*

43. Deep black soil is productive due to high proportion of
(a) sand and zinc (b) gravel and calcium
(c) clay and humus (d) silt and earthworm. *(1991)*

44. Homeostasis is
(a) tendency to change with change in environment
(b) tendency to resist change
(c) disturbance in regulatory control
(d) plants and animal extracts used in homeopathy. *(1991)*

13.2 Populations

45. Which of the following is not an attribute of a population?
(a) Sex ratio (b) Natality
(c) Mortality (d) Species interaction
(NEET 2020)

46. Carnivorous animals lions and leopards, occupy the same niche but lions predate mostly larger animals and leopards take smaller ones. This mechanism of competition is referred to as
(a) character displacement
(b) altruism
(c) resource partitioning
(d) competitive exclusion. *(Odisha NEET 2019)*

47. Between which among the following, the relationship is not an example of commensalism?
(a) Orchid and the tree on which it grows
(b) Cattle Egret and grazing cattle
(c) Sea Anemone and Clown fish
(d) Female wasp and fig species
(Odisha NEET 2019)

48. Natality refers to
(a) death rate
(b) birth rate
(c) number of individuals leaving the habitat
(d) number of individuals entering a habitat.
(NEET 2018)

49. Which one of the following plants shows a very close relationship with a species of moth, where none of the two can complete its life cycle without the other?
(a) *Hydrilla* (b) *Yucca*
(c) Banana (d) *Viola* *(NEET 2018)*

50. In a growing population of a country,
(a) pre-reproductive individuals are more than the reproductive individuals
(b) reproductive individuals are less than the post-reproductive individuals
(c) reproductive and pre-reproductive individuals are equal in number
(d) pre-reproductive individuals are less than the reproductive individuals. *(NEET 2018)*

51. Which one of the following population interactions is widely used in medical science for the production of antibiotics?
(a) Commensalism (b) Mutualism
(c) Parasitism (d) Amensalism
(NEET 2018)

52. Asymptote in a logistic growth curve is obtained when
(a) K = N
(b) K > N
(c) K < N
(d) the value of '*r*' approaches zero. *(NEET 2017)*

53. Mycorrhizae are the example of
(a) amensalism (b) antibiosis
(c) mutualism (d) fungistasis.
(NEET 2017)

54. Which of the following is correct for r-selected species?
(a) Large number of progeny with small size
(b) Large number of progeny with large size
(c) Small number of progeny with small size
(d) Small number of progeny with large size
(NEET-II 2016)

55. If '+' sign is assigned to beneficial interaction, '–' sign to detrimental and 'O' sign to neutral interaction, then the population interaction represented by '+' '–' refers to
(a) mutualism (b) amensalism
(c) commensalism (d) parasitism.
(NEET-II 2016)

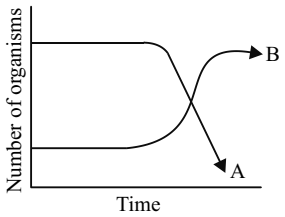
56. The principle of competitive exclusion was stated by
(a) C. Darwin (b) G.F. Gause
(c) Mac Arthur (d) Verhulst and Pearl.
(NEET-II 2016)

57. When does the growth rate of a population following the logistic model equal zero? The logistic model is given as dN/dt = rN(1–N/K)
(a) when N/K equals zero
(b) when death rate is greater than birth rate
(c) when N/K is exactly one
(d) when N nears the carrying capacity of the habitat. *(NEET-I 2016)*

58. Gause's principle of competitive exclusion states that
(a) no two species can occupy the same niche indefinitely for the same limiting resources
(b) larger organisms exclude smaller ones through competition
(c) more abundant species will exclude the less abundant species through competition
(d) competition for the same resources exclude species having different food preferences.
(NEET-I 2016)

59. In which of the following interactions both partners are adversely affected?
(a) Parasitism (b) Mutualism
(c) Competition (d) Predation *(2015)*

60. The following graph depicts changes in two populations (A and B) of herbivores in a grassy field. A possible reason for these changes is that



(a) population A produced more offspring than population B
(b) population A consumed the members of population B
(c) both plant populations in this habitat decreased
(d) population B competed more successfully for food than population A. *(2015 Cancelled)*

61. According to Darwin, the organic evolution is due to
(a) competition within closely related species
(b) reduced feeding efficiency in one species due to the presence of interfering species
(c) intraspecific competition
(d) interspecific competition. *(NEET 2013)*

62. Besides paddy fields, cyanobacteria are also found inside vegetative part of
(a) *Equisetum* (b) *Psilotum*
(c) *Pinus* (d) *Cycas.* *(NEET 2013)*

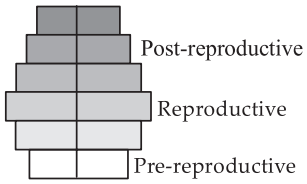
63. A sedentary sea anemone gets attached to the shell lining of hermit crab. The association is
(a) commensalism
(b) amensalism
(c) ectoparasitism
(d) symbiosis. *(NEET 2013)*

64. A biologist studied the population of rats in a barn. He found that the average natality was 250, average mortality 240, immigration 20 and emigration 30. The net increase in population is
(a) 05 (b) zero
(c) 10 (d) 15. *(NEET 2013)*

65. The age pyramid with broad base indicates
(a) high percentage of old individuals
(b) low percentage of young individuals
(c) a stable population
(d) high percentage of young individuals.
(Karnataka NEET 2013)

66. *Cuscuta* is an example of
(a) ectoparasitism (b) brood parasitism
(c) predation (d) endoparasitism.
(Mains 2012)

67. What type of human population is represented by the following age pyramid?



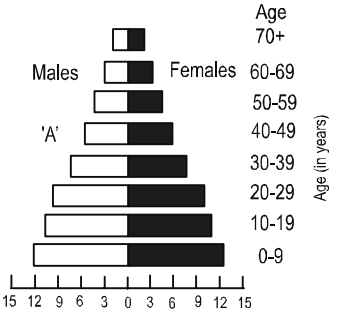
(a) Vanishing population
(b) Stable population
(c) Declining population
(d) Expanding population *(2011)*

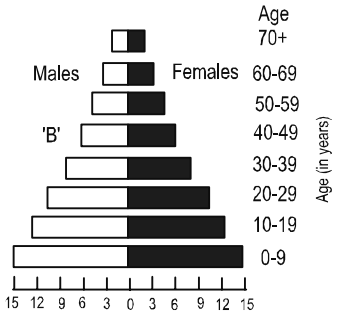
68. Which one of the following is categorised as a parasite in true sense?
(a) The female *Anopheles* bites and sucks blood from humans.
(b) Human fetus developing inside the uterus draws nourishment from the mother.
(c) Head louse living on the human scalp as well as laying eggs on human hair.
(d) The cuckoo (koel) lays its eggs in crow's nest.
(2011)

69. The logistic population growth is expressed by the equation
(a) $dt/dN = Nr\left(\frac{K-N}{K}\right)$ (b) $dN/dt = rN\left(\frac{K-N}{K}\right)$
(c) $dN/dt = rN$ (d) $dN/dt = rN\left(\frac{N-K}{N}\right)$.
(Mains 2011)

70. Which one of the following is most appropriately defined?
(a) Host is an organism which provides food to another organism.
(b) Amensalism is a relationship in which one species is benefitted whereas the other is unaffected.
(c) Predator is an organism that catches and kills other organism for food.
(d) Parasite is an organism which always lives inside the body of other organism and may kill it.
(Mains 2010)

71. A country with a high rate of population growth took measures to reduce it. The figure below shows age-sex pyramids of populations A and B twenty years apart. Select the correct interpretation about them.





Interpretations:

(a) "B" is earlier pyramid and shows stabilized growth rate.
(b) "B" is more recent showing that population is very young.
(c) "A" is the earlier pyramid and no change has occurred in the growth rate.
(d) "A" is more recent and shows slight reduction in the growth rate. *(2009)*

72. Geometric representation of age structure is a characteristic of
(a) population (b) landscape
(c) ecosystem (d) biotic community. *(2007)*

73. The population of an insect species shows an explosive increase in numbers during rainy season followed by its disappearance at the end of the season. What does this show?
(a) The food plants mature and die at the end of the rainy season.
(b) Its population growth curve is of J-type.
(c) The population of its predators increases enormously.
(d) S-shaped or sigmoid growth of this insect. *(2007)*

74. If the mean and the median pertaining to a certain character of a population are of the same value, the following is most likely to occur
(a) a bi-modal distribution
(b) a T-shaped curve
(c) a skewed curve
(d) a normal distribution. *(2007)*

75. A high density of elephant population in an area can result in
(a) intraspecific competition
(b) interspecific competition
(c) predation on one another
(d) mutualism. *(2007)*

76. Certain characteristic demographic features of developing countries are
(a) high fertility, low or rapidly falling mortality rate, rapid population growth and a very young age distribution
(b) high fertility, high density, rapidly rising mortality rate and a very young age distribution
(c) high infant mortality, low fertility, uneven population growth and a very young age distribution
(d) high mortality, high density, uneven population growth and a very old age distribution. *(2004)*

77. What is a keystone species?
(a) A species which makes up only a small proportion of the total biomass of a community, yet has a huge impact on the community's organization and survival.
(b) A common species that has plenty of biomass, yet has a fairly low impact on the community's organization.
(c) A rare species that has minimal impact on the biomass and on other species in the community
(d) A dominant species that constitutes a large. proportion of the biomass and which affects many other species. *(2004)*

78. The maximum growth rate occurs in
(a) stationary phase
(b) senescent phase
(c) lag phase
(d) exponential phase. *(2004)*

79. Mycorrhiza is an example of
(a) symbiotic relationship
(b) ectoparasitism
(c) endoparasitism
(d) decomposers. *(2003)*

80. Two opposite forces operate in the growth and development of every population. One of them is related to the ability to reproduce at a given rate. The force opposite to it is called
(a) fecundity
(b) environmental resistances
(c) biotic control
(d) mortality. *(2003, 1998)*

81. Which type of association is found in between entomophilous flower and pollinating agent?
(a) Mutualism (b) Commensalism
(c) Co-operation (d) Co-evolution *(2002)*

82. Two different species cannot live for long duration in the same niche or habitat. This law is
(a) Allen's law
(b) Gause's hypothesis
(c) Dollo's rule
(d) Weismann's theory. *(2002)*

83. In a population, unrestricted reproductive capacity is called as
(a) biotic potential (b) fertility rate
(c) carrying capacity (d) birth rate. *(2002)*

84. In which of the following plant sunken stomata are found?
(a) *Nerium* (b) *Hydrilla*
(c) Mango (d) Guava *(2001)*

85. An interesting modification of flower shape for insect pollination occurs in some orchids in which a male insect mistakes the pattern on the orchid flower for the female species and tries to copulate with it, thereby pollinating the flower. This phenomenon is called
(a) pseudopollination (b) pseudoparthenocarpy
(c) mimicry (d) pseudocopulation. *(1998)*

86. The abundance of a species population, within its habitat, is called
(a) relative density (b) regional density
(c) absolute density (d) niche density. *(1995)*

87. Which one of the following pairs is correctly matched?
(a) Parasitism - intraspecific relationship
(b) Uricotelism - aquatic habitat
(c) Excessive perspiration - xeric adaptation
(d) Streamlined body - aquatic adaptation *(1995)*

88. Mycorrhiza exhibits the phenomenon of
(a) parasitism (b) symbiosis
(c) antagonism (d) endemism. *(1994)*

89. Association of animals when both partners are benefitted
(a) colony (b) mutualism
(c) commensalism (d) ammensalism. *(1993)*

90. Which one is true?
(a) Commensalism when none of the interacting populations affect each other.
(b) Symbiosis when the interaction is useful to both the populations.
(c) Symbiosis when neither populations affects each other.
(d) Commensalism when the interaction is useful to both the populations. *(1991)*

91. The relation between algae and fungi in a lichen is
(a) symbiosis (b) parasitism
(c) commenalism (d) protocooperation. *(1989)*

92. A mutually beneficial association necessary for survival of both partners is
(a) mutualism/symbiosis
(b) commensalism
(c) amensalism
(d) both (a) and (b). *(1988)*

93. Competition for light, nutrients and space is most severe between
(a) closely related organism growing in different niches
(b) closely related organisms growing in the same area/niche
(c) distantly related organisms growing in the same habitat
(d) distantly related organisms growing in different niches. *(1988)*

ANSWER KEY

1.	(d)	**2.**	(a)	**3.**	(a)	**4.**	(a)	**5.**	(d)	**6.**	(d)	**7.**	(b)	**8.**	(d)	**9.**	(c)	**10.**	(c)
11.	(a)	**12.**	(c)	**13.**	(b)	**14.**	(d)	**15.**	(c)	**16.**	(c)	**17.**	(c)	**18.**	(d)	**19.**	(c)	**20.**	(d)
21.	(a)	**22.**	(a)	**23.**	(b)	**24.**	(c)	**25.**	(c)	**26.**	(d)	**27.**	(c)	**28.**	(c)	**29.**	(d)	**30.**	(b)
31.	(b)	**32.**	(d)	**33.**	(d)	**34.**	(b)	**35.**	(c)	**36.**	(a)	**37.**	(c)	**38.**	(a)	**39.**	(d)	**40.**	(d)
41.	(a)	**42.**	(b)	**43.**	(c)	**44.**	(b)	**45.**	(d)	**46.**	(c)	**47.**	(d)	**48.**	(b)	**49.**	(b)	**50.**	(a)
51.	(d)	**52.**	(a)	**53.**	(c)	**54.**	(a)	**55.**	(d)	**56.**	(b)	**57.**	(c)	**58.**	(a)	**59.**	(c)	**60.**	(d)
61.	(c)	**62.**	(d)	**63.**	(a)	**64.**	(b)	**65.**	(d)	**66.**	(a)	**67.**	(c)	**68.**	(c)	**69.**	(b)	**70.**	(c)
71.	(d)	**72.**	(a)	**73.**	(b)	**74.**	(d)	**75.**	(a)	**76.**	(a)	**77.**	(a)	**78.**	(d)	**79.**	(a)	**80.**	(b)
81.	(d)	**82.**	(b)	**83.**	(a)	**84.**	(a)	**85.**	(d)	**86.**	(d)	**87.**	(d)	**88.**	(b)	**89.**	(b)	**90.**	(b)
91.	(a)	**92.**	(a)	**93.**	(b)														

Hints & Explanations

1. (d) : Niche is specific part of habitat occupied by individuals of a species which is circumscribed by its range of tolerance, range of movement, microclimate, etc. Hence, niche refers to the functional role played by the organism where it lives.

2. (a) : Pneumatophores are breathing or respiratory roots which are found in plants growing in mangroves or water logged soil or saline swamps. Such plants are called halophytes.

3. (a) : Presence of pneumatophores, *i.e.*, small negatively geotropic vertical roots and vivipary or seed germination while attached to plant are adaptations of halophytes, *i.e.*, plants growing in saline habitat.

4. (a)

5. (d) : The small animals have smaller surface area to body volume ratio. They have higher metabolic rates than larger animals. Therefore, it is much easier for small animals to move uphill than large animals.

6. (d) : Biological or biotic community is an assemblage of populations of different species of plants, animals, bacteria and fungi which live in a particular area and interact with one another through competition, predation, mutualism, etc. Each biotic community has a specific composition and structure, *e.g.*, pond community.

7. (b) : Tropical rainforests have a very dense plant cover. They also experience a large amount of precipitation, thus the forest floor is always damp. Thus, the conditions there have led animals to get adapted to arboreal habitats. Most animals found there are tree dwellers as almost every space on the forest floor is occupied by the vegetation.

8. (d)

9. (c) : Parasitism is a relationship between two living organisms of different species in which one organism called parasite obtains its food directly from another living organism called host. The parasite spends a part or whole of its life either on or inside the body of the host. The general parasitic adaptations are (i) anaerobic respiration in internal parasites, (ii) loss of certain organs, (iii) presence of adhesive organs, (iv) excessive multiplication, (v) resistant cysts and eggs for safe transfer of their progeny to new hosts and (vi) well developed and complicated reproductive organs.

10. (c) : Benthic organisms are bottom dwelling forms found crawling or attached to the bottom. The sediment characteristics often determine the type of benthic animals that can thrive there.

11. (a) : Tourists visiting high altitude areas such as Rohtang Pass or Mansarovar, experience altitude sickness. Its symptoms include nausea, fatigue and heart palpitations. This is because in the low atmospheric pressure of high altitudes, the body does not get enough oxygen. But, gradually we get acclimatized and stop experiencing altitude sickness. The body compensates low oxygen availability by increasing red blood cell production, decreasing the binding affinity of haemoglobin and by increasing breathing rate.

12. (c) : Lianas are large climbing woody vines that drape tropical rainforest trees. They have adapted to life in rainforest by having their roots in the ground and climbing high onto the tree canopy to reach available sunlight. Many lianas start life in the rainforest canopy and send roots down to the ground.

13. (b) : Desert lizards lack the physiological ability that mammals have to deal with the high temperature of their habitat, but manage to keep their body temperature fairly constant by behavioural means. They bask in the sun and absorb heat when their body temperature drops below the comfort zone, but move into shade when the ambient temperature starts increasing. Some species are capable of borrowing into the soil to hide and escape from the above-ground heat.

14. (d) : Some organisms are able to maintain homeostasis by physiological (sometimes behavioural also) means which ensures constant body temperature, constant osmotic concentration, etc. They are known as regulators. A majority of animals and plants cannot maintain a constant internal environment. Their body temperature changes with the ambient temperature. These animals and plants are simply conformers. During the course of evolution, the costs and benefits of maintaining a constant internal environment are taken into consideration. Some species have evolved the ability to regulate, but only over a limited range of environmental conditions, beyond which they simply conform. They are known as partial regulators.

15. (c) : In hydrophytes mechanical tissue, *i.e.*, sclerenchyma, conducting tissue xylem, absorbing tissues are in reduced form or absent. Cuticle is either completely absent or if present it is thin and poorly developed.

16. (c) : Kangaroo rat (*Dipodomys merriami*) feeds on dry seeds. It seldom drinks water. The requirement of water is met by food (10%) and metabolic water (90%). Water loss is prevented by living in burrows during the day, concentration of urine and solidification of faeces. It has a thick coat to minimise evaporative desiccation.

17. (c) : Temperate broad leaf (deciduous) forests have warm summer and moderately cool winter. Rainfall is 100 – 250 cm. Dominant trees are oak, elm, birch, maple ash, chestnut, hickory, beech, poplar and *Magnolia*. Indian temperate broad leaves forests are dominated by oak like *Quercus semecarpifolia* (Brown oak of Himalayas, Khrsu oak), *Q. floribunda* (Tilonaj oak), *Q. lanuginose* (Rianj oak) and *Q. leucotrichophora* (Banj oak). Fauna of latitudinal temperate broad leaf forests consists of deer, fox, beaver, wild cat, racoon, etc.

18. (d) : Niche/ecological niche is specific part of habitat occupied by individuals of a species which is circumscribed by its range of tolerance, range of movement, microclimate, type of food and its availability, shelter, type of predator and timing of activity. A habitat has several ecological niches and supports a number of species. An ecological niche is used by a single species. Two or more species cannot use the same niche despite having a mutualistic association. Organisms or populations in competition have a niche overlap of a limited resource for which they compete. Both owl and cat feed on shrews and mice. They occupy the same niche

because of being ecological equivalents though their habitats are different.

19. (c) : At high altitudes composition of air remains almost same as at sea level, but density (barometric pressure) of air gradually decreases due to which arterial pO_2 is also decreased (hypoxemia). High altitudes has complex conditions to which human body has to acclimatize. Number of red blood cells per unit volume of blood is likely to be higher in a person living at high altitudes. This is in response to the air being less dense at high altitude. More number of red blood cells are needed to trap O_2 from rarefied air having low pO_2 (partial pressure of oxygen).

20. (d) : Migration is the seasonal movement of complete populations of animals to a more favourable environment. It is common in mammals (*e.g.*, porpoises), fish (*e.g.*, eels and salmon) and some insects but is most marked in birds. The arctic tern, for example, migrates annually from its breeding ground in the Arctic circle to the Antarctic. Salmon usually migrate from marine to fresh water to spawn. The siberian crane, breeds in arctic Russia in Yakutia and Western Siberia. It is a long distant migrant. Salamander is an amphibian with slender body, short legs and long tail. Outside the breeding season they are seldom seen as they spend most of their time underground.

21. (a) : Praying mantis shows the phenomenon of camouflage by blending itself into the background. This enables it to elude predators.

22. (a) : Nearly about 97% of the earth's water is saline in the oceans and seas. 3% of the earth's water is locked up on the polar ice caps. 85% of the frozen freshwater is in the Antarctic is ice cap, 15% of the frozen freshwater is in the northern polar ice cap and glaciers.

23. (b) : Earth does not receive equal radiation at all points. The East West rotation of earth provides equal exposure to sunlight but latitude and dispersion do affect the amount of radiation received. The poles receive far less radiation than equator. This uneven heating is called differential insolation. At 40° North and South, approximately the heat gain is equal to heat loss through terrestrial radiation.

24. (c) : Colour change in *Chameleon* and melanism in moths are examples of camouflage in animals adapted to prevent predation from prey. As a defence mechanism puffers have the ability to inflate rapidly, filling their extremely elastic stomach with water (or air) until they are almost spherical. This prevents them from being identified by the predator. But poison fangs in snakes are a method adopted for preying and not escaping predation.

25. (c) : A biome is a major terrestrial community characterized by a distinct climate and inhabited by a particular species of plants and animals. Tundra is characterized by precipitation of less than 25 cm annually. Permafrost or permanent ice is found about a meter down from the surface, it never melts and is impenetrable to both water and roots. Savannahs are open grasslands with scattered shrubs and trees. Coniferous forest contain evergreen trees. In these forests all plants do not shed their leaves at the same time hence forest remains always evergreen. But Prairies is a grassland and epiphytes and ephemerals are found in deserts.

26. (d) : Black soil forms the largest group. It is developed mainly on the Deccan traps of Maharashtra, Madhya Pradesh and Kathiawar. Because of its hydrology and climatic conditions of the environment, the medium and deep black soils are very suitable for cotton cultivation. Laterite soil is rich in insoluble iron oxides and aluminium compounds, which gives laterites a reddish appearance. Chernozems are rich in nutrients (due to abundant organic rich compounds) and consequently the most fertile in the world.

27. (c) : Deserts are places where the diurnal temperatures vary greatly. It is extremely hot during the day time and very cold at night. This change in temperature also affects the temperature condition of the soil.

28. (c) : Species may be defined as the uniform interbreeding population of individuals which freely interbreed among themselves. Niche represents the habitat and functions of a species. Habitat is a specific place where an organisms lives.

29. (d) : Mimicry is defined as the resemblance of one organism to another or to any natural object. It is specially evolved primarily for concealment and protection. Concealment itself may prove to be defensive and may also help in offence.

30. (b) : Tropical forests are found in tropical zone of the world and are characterized by very high temperature with rainfall in abundance. The flora of tropical rain forest is very rich and highly diversified. The tropical forests have a very rich fauna both in density as well as in varieties. The reason for this high diversity and variety of flora and fauna is the occurrence of suitable conditions in these forests.

31. (b) : Desert animals prefer to live under the surface. The animal residing either permanently or for most of life inside the burrows or under the earth surface are known as burrowing or fossorial animals and their mode of existence is described as subterranean or underground.

32. (d) : Tropical shrubs or thorn forests are found in places where moisture conditions are intermediate between desert and savanna on one hand and seasonal or rainforests on the other hand. *Acacia* and *Prosopis* are non-succulent perennial plants and *Capparis* is a xerophytic shrub.

33. (d) : Tropical forests are found in tropical zone of the world and are characterised by very high temperature with rainfall in abundance. The flora of tropical rain forest is very rich and highly diversified. The tropical forests have a very rich fauna both in density as well as in varieties. The reason for this high diversity and variety of flora and fauna is the occurrence of suitable conditions in these forests. So these are more vulnerable to invasion by outside plants and animals.

34. (b) : Therophytes are those plants that survive the winter as a seed and complete their life cycle between the spring and autumn.

35. (c) : Benthoic organisms are attached or rest on the bottom sediments. Benthic animal may be divided into filter feeders, *e.g.*, clams and deposit feeders, *e.g.*, snails.

36. (a) : *Refer to answer 18.*

37. (c) : Allen's law states, animals that live in very cold climates, their extremities such as ears, tails, etc., become progressively smaller. Cope's law states that there is a tendency for animals to increase in size during the long course of evolution. Dollo's law states that evolution is irreversible. Bergmann's law states that warm blooded animals become larger in the northern and colder parts of their range.

38. (a) : Ecology is the branch of science which deals with the study of inter-relationship between organisms and their environment. The scope of ecology is very vast as it treats the organisms at the level of population, community and ecosystem.

39. (d) : The sum total of the populations of the same kind of organisms constitute species. A species is a group of individuals of same kind of phenotypic characters and can interbreed.

40. (d) : Soil fertility is the characteristic of soil that supports abundant plant life. In particular the term is used to describe agricultural and garden soil.

41. (a) : Soil particles determines its texture. The soil particles enclose living spaces in between them called pore space. In coarse textured soils, the pore space is wide but pore frequency is low. But in fine textured soil, the pore space is narrow but pore frequency is high.

42. (b) : The ability to maintain a steady state within constantly changing environment is essential for the survival of living systems. The maintenance of a constant internal environment is called homeostasis.

43. (c) : Deep black soil is productive due to high proportion of clay and humus. The organic matter present in the soil is contributed by the death and decay of living organisms. These are the richest in nutrients and therefore these soils are the most fertile.

44. (b) **45. (d)** **46. (c)**

47. (d) : Female wasp and fig species shows example of mutualism.

48. (b) : Natality refers to the number of births during a given period in the population that are added to the initial density. Death rate or mortality is the number of deaths in the population during a given time period. Immigration is the number of individuals entering a habitat. Emigration is the number of individuals of the population that left the habitat and had gone elsewhere during a time period.

49. (b) : *Yucca* has an obligate mutualism with a species of moth, *i.e.*, *Pronuba*. The only pollinator of this plant is the Yucca moth. The Yucca moth is likewise dependent upon the *Yucca* plant as Yucca moth caterpillars need to eat *Yucca* seed only or starve.

50. (a) : In a population where the number of pre-reproductive individuals or the younger individual is larger than the reproductive individuals, the population will increase.

51. (d) : Amensalism is a relationship between organisms of different species in which an organism does not allow other organism to grow or live near it. Inhibition is achieved through the secretion of chemicals called allochemics. Antibiotics are a kind of allochemics produced by some microbes which in small concentration can kill or retard growth of harmful microbes without adversely affecting the host.

52. (a) : Asymptote in a logistic growth curve is obtained when carrying capacity (K) reaches the population density (N), *i.e.*, K = N.

53. (c) : Mycorrhiza is a mutualistic interaction between a fungus and roots of higher plants.

54. (a) : Organisms that are *r*-selected (*r*-strategists) able to colonise a habitat rapidly, utilising the food and other resources before other organisms are established and begin to compete. The *r*-strategists tend to be relatively small organisms with short life spans (*e.g.*, bacteria) and often live in temporary or unstable environments; characteristically their survival depends on their ability to produce large numbers of offspring rather than on their ability to compete.

55. (d) : Parasitism is an association in which one organism (the parasite) lives on (ectoparasitism) or in (endoparasitism) the body of another organism (host), from which it obtains its nutrients. This association is beneficial for the parasites as they get continuous supply of nutrients from their host and are able to rapidly multiply their numbers. But it is detrimental for the host organism as parasitic infection leads to various complications and diseases in the host body may also be fatal to the host under certain circumstances.

56. (b) **57. (c)**

58. (a) : Two or more species with closely similar niche requirements cannot exist indefinitely in the same area as sooner or later they come into competition for possession of it. This is called as Gause's principle of competitive exclusion, which states that an ecological niche cannot be simultaneously and completely occupied by established populations of more than one species. Two species can live in same habitat but not in the same niche. More similar the two niches are, severe the competition is.

59. (c) : Competition is the rivalry between two or more organisms for obtaining the same resources such as food, light, water, space, shelter, mate, etc. Competitors adversely affect each other.

60. (d) : Both the populations are herbivorous, thus they cannot affect each other. If the food sources for

these populations A and B have decreased, then both the populations A and B would have declined. If population A have produced more offspring then the graph A should have increased. Based on the graph, population B is more successful in competing with population A, that is why number of organisms in population B increased while that in population A decreased, as they get access to limited resources.

61. (c) : Intraspecific competition leads to evolution. Variations arise naturally in a growing population due to crossing over, etc. Organisms with variations better suited to their environment are favoured by natural selection, while less fitted ones are eliminated. Gradually this continued process of natural selection leads to evolution. Interspecfic struggle also plays a role in evolution but intraspecific struggle is more intense and prominent one.

62. (d) : Coralloid roots of *Cycas* have symbiotic association with blue-green algae like *Nostoc* and *Anabaena*. Coralloid roots are irregular, negatively geotropic, dichotomously branched coral like roots which do not possess root hairs and root caps.

63. (a)

64. (b) : Natality and immigration positively contribute to the population growth while mortality and emigration are negative factors. In the given question,
The net increase in population is
natality + immigration = 250 + 20 = 270
The net decrease in population is
mortality + emigration = 240 + 30 = 270
Thus, net increase in population = 270 – 270 = 0

65. (d) : Age pyramid is a graphic representation of abundance of individuals of different age groups with pre-reproductive individuals at the base, reproductive individuals in the middle and post-reproductive individuals at the top. Triangular age pyramid has high proportion of pre-reproductive individuals, moderate number of reproductive individuals and fewer post-reproductive individuals. It represents young or rapidly growing population. In bell-shaped age pyramid, the number of pre-reproductive and reproductive individuals is almost equal. Post-reproductive individuals are comparatively fewer. It represents stable or stationary population where growth rate is nearly zero. In urn-shaped age pyramid, the number of reproductive individuals is higher than the number of pre-reproductive individuals. It represents declining or diminishing population.

66. (a) : *Cuscuta* is a total stem parasite which is a good example of ectoparasitism. It is commonly found growing on hedge plants. It has lost chlorophyll and leaves in the course of evolution. It attaches and wraps itself around the stem of host plant and produces haustoria that gets inserted into the vascular system of host. The parasitic plant sucks all the nutrients from the host plant with the help of haustoria. *Cuscuta* is known to receive even the flower inducing hormone or florigen from the host.

67. (c)

68. (c) : Parasitism is an association in which one organism (the parasite) lives on (ectoparasitism) or in (endoparasitism) the body of another (the host), from which it obtains its nutrients. They also produce vast numbers of eggs there, *e.g.*, head louse living on the human scalp.

69. (b) : Logistic population growth is expressed by following equation:

$$\frac{dN}{dt} = rN\left(\frac{K-N}{K}\right)$$

Where, N = population density at time t
r = intrinsic rate of natural increase
K = carrying capacity

70. (c) : Predation is an interaction between members of two species in which members of one species capture, kill and eat up members of other species. Host is a term which is specifically related to parasitism. Amensalism is an interspecies interaction in which one species is harmed whereas the other one is unaffected. Parasitic organism can live both over the surface of their host or inside their body.

71. (d) : "A" is more recent and shows slight reduction in growth rate.

72. (a) : Population has several characteristics or attributes which are a function of the whole group and not of an individual. Age distribution is one of them that is the number or the percentage of individuals in a population in different age groups. This is represented geometrically in the form of age pyramid.

73. (b) : J-shape of growth pattern can be easily observed in algae blooms, some insects, annual plants and the lemmings of Tundra. In the beginning density of the population increases rapidly in compound interest fashion and then stops abruptly as the environmental resistance or other limiting factors become effective. These factors may be food, space, seasonal (frost, excessive rain, etc.) or the termination of reproduction session.

74. (d) : If the mean and the median pertaining to a certain character of a population are of the same value, a normal distribution is most likely to occur.

75. (a) : Competition is rivalry for obtaining the same resource. Competition is of two types, intraspecific and interspecific. Intraspecific competition is the competition amongst members of the same species for a common resource. It may be for food, space and mate. So if the density of elephant population in an area increases, it will lead to intraspecific competition. This will lead to the establishment of territories in elephants which will result in pushing out of the extra number securing shelter, mate and food for the rest.

76. (a) : In developing countries, the conditions are becoming better for survival of human beings. So the mortality rate or the number of individuals dying per unit of time is low. Mortality or the average number of

individuals produced by a population in a unit of time is high. So that there is rapid population growth and there are more individuals in the pre-reproductive age group. So there is young age distribution.

77. (a) : Keystone species are those species which has significant and disproportionately large influence on the community structure and characteristics. It has often considerably low abundance and biomass as compared to dominant species. Removal of such species causes serious disruption in structure and function of community.

78. (d) : Maximum growth rate occurs in exponential or acceleration or log phase. The point at which the exponential growth begins to slow down is known as inflexion point.

79. (a) : In mutalism or symbiosis both the organisms in association are mutually benefitted and further this association is obligatory, *i.e.*, necessary for existence of both organisms. Mycorrhiza is a example of symbiosis. It is association between roots of higher plants and fungal hyphae. The fungal hyphae supply water and nutrients to the plant and in turn get food form the plant. So both the organism are mutually benefitted.

80. (b) : The environmental factors which can check the growth of population size constitute the environmental resistance. These include predators, food, water, nesting sites, similar competitors, etc. All living things tend to reproduce until the point at which their environment becomes a limiting factor. No population, human or otherwise, can grow indefinitely; eventually, some biotic or abiotic variable will begin to limit population growth.

81. (d) : Co-evolution can occur in any interspecific relationship like symbiosis or mutualism. The relation between an entomophilous flower and pollinating insect shows co-evolved mutualism. In this the plant depends exclusively on the insect for pollination and the insect relies on the plant for food.

82. (b) : Interspecific competition is rivalry amongst members of different species. The severity of competition depends upon similarity in the requirement of food and shelter. Every type of organism has a particular niche, no two organisms can live in same niche. One of the two is eliminated. This phenomenon is called Gause hypothesis of competitive exclusion.

83. (a) : Biotic potential is defined as the physiological capacity of organisms to produce their offspring under natural conditions. It is also called reproductive potential. In nature, the biotic potential of organisms is enormous but all the organisms do not survive due to the lack of food and space. There are also a number of diseases and the predatory organisms, that feed upon other organisms. The carrying capacity is the maximum number of individuals which the environment can support or sustain.

84. (a) : Usually the stomata are placed at the same level as the adjoining epidermal cells (*e.g.*, *Helianthus*, *Mangifera*). In xerophytes the stomata are sunken as they are located in a cup-shaped depression (*e.g.*, *Nerium*). It is an adaptation to reduce the loss of water in xerophytic plants.

85. (d) : In an orchid *Ophrys speculum*, there is most interesting and unique mechanism of pollination. Here pollination occurs by a wasp called *Colpa aurea*. In this orchid, pollination occurs by act of pseudocopulation. The appearance and odour of *Ophrys* is similar to female wasp and are mistaken by male wasps and they land on *Ophrys* flowers to perform act of pseudocopulation and thus pollination takes place. This plant-insect relationship is useful only to plant.

86. (d)

87. (d) : Streamlined body is a secondary aquatic adaptation. It is found in animals that live permanently in water but most of them are amphibious in nature. The streamlined body consists of compression of head, body and tail into a curved streamlined form. There is no protruberance over the body so that the animal can move easily through water. Parasitism is a relationship between two organisms of different species in which one organism called parasite obtains its food directly from another living organism called host. In xeric adaptation perspiration is reduced to conserve water. Uricotelism is characteristic of terrestrial animals which excrete uric acid.

88. (b) : Association between roots of higher plants, *e.g.*, pine, birch and fungal hyphae is called mycorrhiza. It exhibits the phenomenon of symbiosis. Here both the organisms in association are mutually benefitted. In this, fungal hyphae take nutrition from the plant and in return increase surface area for absorption of water and minerals for the plant. Parasitism is a phenomenon that involves a parasite which lives in constant association of the host and gets its food directly or indirectly without killing the host. Antagonism is the inhibition of growth of one organism by another. Endemism is the permanent occurrence of an organism inside another organism.

89. (b)

90. (b) : In mutalism or symbiosis both the organisms in association are mutually benefitted and further this association is obligatory, *i.e.*, necessary for existence of both organisms.

91. (a) : Algae and fungi in a lichen show symbiotic relationship. Fungi give support protection and help in absorption of water while algae provide food to fungi which is achlorophyllous. No one is harmed but both are benefitted by each other.

92. (a) **93. (b)**

❖❖❖