Organisms and Populations

Chapter 35

FACT/DEFINITION TYPE QUESTIONS

1. The term 'precipitation' includes
(a) rain
(b) snow
(c) hails
(d) all forms of water that fall to the ground.

2. What are the key elements that lead to so much variations in the physical and chemical conditions of different habitats?
(a) Temperature and water
(b) Light and soil
(c) Only temperature
(d) Temperature, water, light and soil

3. A majority of organisms which are restricted to narrow range of temperature are called as
(a) stenothermal (b) endothermal
(c) ectothermal (d) eurythermal

4. A few organisms can tolerate and thrive a wide range of temperature. Such animals are called
(a) stenothermal (b) eurythermal
(c) thermophilic (d) ectothermal

5. The salinity in sea water in parts per thousand (ppt) ranges between
(a) 5-15% (b) 30-35%
(c) 50-75% (d) more than 100%

6. Organisms that are restricted to a narrow range of salinity, are called
(a) ectohaline (b) osmoconformer
(c) euryhaline (d) stenohaline

7. Deep (>500m) in the oceans, the environment is perpetually dark and its inhabitants are not aware of the existence of a celestial source of energy called_____.
(a) ATP (b) photosynthesis
(c) sun (d) light

8. Percolation and water holding capacity of soil is dependent upon
(a) soil composition (b) grain size
(c) aggregation (d) all of these

9. The benthic organisms
(a) live near the sea bottom.
(b) found in open water.
(c) always live at the depth of 50-100 m.
(d) live outside water.

10. The process in which the body's internal environment is kept stable is known as
(a) homeostasis (b) adaptation
(c) geometry (d) acclimatization

11. Which of the following is the stage of suspended development?
(a) Dormancy (b) Hibernation
(c) Aestivation (d) Diapause

12. To avoid summer - related problems such as heat and dessication fish undergoes
(a) hibernation (b) diapause
(c) aestivation (d) none of these

13. _____ is any attribute of the organism (morphological physiological, behavioural) that enables the organisms to survive and reproduce in its habitat.
(a) Exponential growth (b) Acclimatization
(c) Adaptation (d) Mutualism

14. Seals have a thick layer of fat (blubber) below their skin that acts as an
(a) thermostat (b) capacitor
(c) resistor (d) insulator

15. Microbes present in hydrothermal vents where the temperature far exceed 100°C is
(a) cyanobacteria (b) archaebacteria
(c) eubacteria (d) none of these

16. If the age distribution (per cent individuals of a given age or group) is plotted for the population, the resulting structure is called a/an
(a) population density (b) ecological pyramid
(c) population growth (d) age pyramid

17. The age of pyramid with narrow base indicates
(a) high number of young individuals.
(b) low number of young individuals.
(c) high number of old individuals.
(d) low number of old individuals.

18. Which of the following parameter is not a part of population growth?
(a) Natality (b) Mortality
(c) Metapopulation (d) Emigration

19. _____ is the number of individuals of the population who left the habitat and have gone elsewhere during the time period under consideration.
(a) Natality (b) Mortality
(c) Immigration (d) Emigration

20. The formula for logistic growth are
(a) $dN / dt = rN$ (b) $rN / dN = dt$
(c) $dN / dt = rN\left[\frac{K - N}{K}\right]$ (d) $dN / dt = rN\left[\frac{N - K}{N}\right]$

21. In growth pattern, (1 – N/K) is
(a) carrying capacity
(b) intrinsic rate of natural increase
(c) environmental resistance
(d) biotic potential

22. Interspecific interaction arise from the interaction of
(a) individuals of a community.
(b) populations and their regulatory factors.
(c) populations of two different species.
(d) none of the above

23. Thorns of *Acacia* and cactus are the most common morphological means of
(a) reproduction (b) competition
(c) defence (d) economical importance

24. Which of the following secondary compounds are produced by plants for the purpose of defences against grazers and browsers?
(a) Strychnine (b) Caffeine
(c) Quinine (d) All of these

25. Connell's elegant field experiments are related to barnacle, in which superior barnacle *Balanus* dominates the inter tidal area, and excludes the smaller barnacle *Chathamalus* from that zone. This phenomenon is called
(a) competitive exclusion principle
(b) competitive release
(c) interspecific competition
(d) none of the above

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

27. _____ in birds is an interesting example of parasitism in which the parasitic bird lays its eggs in the nest of its host and the host incubates them.
(a) Bird parasitism (b) Breed parasitism
(c) Brood parasitism (d) Ectoparasites

28. Which of the following is not an example of commensalism?
(a) Sea anemone and clown fish
(b) Epiphyte / Orchid on mango branch
(c) Liver fluke and fleas
(d) Cattle egret and grazing cattle.

29. The interaction is detrimental to both the species, in
(a) predation (b) commensalism
(c) amensalism (d) competition

30. A wasp pollinating a fig flower is an example of
(a) commensalism (b) amensalism
(c) parasitism (d) mutualism

31. An interaction where one species is harmed while the other is unaffected is called
(a) commensalism (b) competition
(c) amensalism (d) parasitism

STATEMENT TYPE QUESTIONS

32. Consider the following statements (A) - (D) each with one or two blanks.
A. Lichens represent an intimate ____(i)____ relationship between a fungus and ____(ii)____.
B. The ____(iii)____ are associations between fungi and the roots of higher plants.
C. Plants need the help of ____(iv)____ for pollinating their flowers and dispersing their seeds.
D. The ____(v)____ pollinates the fig inflorescence while searching for suitable egg - laying sites.
Which one of the following options, gives the correct fill ups for the respective blank numbers from (i) - (v) in the statements?
(a) (i) Parasitic; (ii) - Cyanobacteria; (iii) - *Mycorrhizae*; (iv) - Wind; (v) - Bee
(b) (i) Mutualistic; (ii) - Cyanobacteria; (iii) - *Mycorrhizae*; (iv) - Animals; (v) Wasp
(c) (i) Parasitic; (ii) - Cyanobacteria; (iii) - *Mycorrhizae*; (iv) - Insect; (v) Bumblebees
(d) (i) Mutualistic; (ii) - Cyanobacteria; (iii) - Lichen; (iv) - Wind; (v) Wasp

33. Consider the following statements (A)-(D) each with one or two blanks.
(A) Bears go into ____(i)____ during winter to ____(ii)____ cold weather.
(B) A conical age pyramid with a broad base represents ____(iii)____ human population.
(C) A wasp pollinating a fig flower is an example of ____(iv)____.
(D) An area with high levels of species richness is known as ____(v)____.
Which one of the following options, gives the correct fill ups for the respective blank numbers from (i) to (v) in the statements?
(a) (i) - hibernation, (ii) - attract, (iii) - expanding, (iv) - commensalism, (v) - biodiversity park
(b) (i) - hibernation, (ii) - escape, (iii) - expanding, (iv) - mutualism, (v) - hot spot
(c) (i) - aestivation, (ii) - escape, (iii) - stable, (iv) - commensalism, (v) - marsh
(d) (i) - aestivation, (ii) - escape, (iii) - stable, (iv) - mutualism, (v) - hot spot

34. Which of the following statement is incorrect ?
(a) Habitat includes both biotic and abiotic factors.
(b) Abiotic and biotic components interact constantly with each other.
(c) Abiotic components alone can characterize the habitat of an organism.
(d) Major abiotic factors includes temperature, water, light and soil.

35. Study the following statements and answer the question.
(i) Mango trees cannot grow in temperate countries like Canada and Germany.
(ii) Tuna fish are rarely caught beyond tropical latitude in the ocean.
(iii) Snow Leopards are not found in Kerala.
Which of the following factor is responsible for the above statements?
(a) Light (b) Water
(c) Temperature (d) Soil

36. Read the following statements (i to v) and answer the question.
(i) Temperature progressively decreases from pole to equator.
(ii) Our intestine is a unique habitat for hundreds of species of microbes.
(iii) Average temperature exceeds 100°C in thermal springs and hydrothermal vents.
(iv) In polar areas and high altitudes temperature goes to 70°C.
(v) Temperature goes to > 50°C in tropical desert in summer.
How many of the above statements are incorrect?
(a) (i), (ii), (iii) (b) (i), (iv)
(c) (ii), (iv), (v) (d) (iii), (iv)

37. Read the following statements and choose the correct option.
(i) Light is essential for life to exist on the earth.
(ii) Many species of small plants under the canopy to tall trees in forest show optimal use of available light due to having large sized antenna and higher number of thylakoids.
(iii) UV rays are not harmful to many organisms.
(iv) Photoperiodic requirement is essential for many plants for flowering.
(v) Red algae can live in deeper water of sea because of having pigment, phycoerythrin.
(a) (i) and (iii) (b) (i), (iii) and (iv)
(c) only (iii) (d) (i), (ii), (iv) and (v)

38. Which of the following statement is false?
(a) Regulators are organisms that are able to maintain homeostasis by physiological means or sometimes by behavioural means.
(b) All birds and mammals, and very few lower vertebrates and invertebrates are capable of osmoregulation and thermoregulation.
(c) Sweating and shivering are the means of thermoregulation by human.
(d) Plants are capable of thermoregulation.

39. Identify the correct statement.
(a) The smaller animals have larger surface area relative to their volume.
(b) Smaller animals are rarely found in polar region.
(c) Bear cannot migrate hence hibernate during winter.
(d) All of the above

40. Identify the incorrect statement
(i) Thermoregulation energetically least expensive process for many organisms like shrews and humming birds.
(ii) 99% animals and nearly all plants cannot maintain their constant internal environment.
(iii) During the course of evolution, the costs and heights of maintaining a constant internal environment are discarded.
(iv) In aquatic animals, the osmotic concentration of the body fluids change with that of the ambient water osmotic concentration.
(a) (i) and (ii) (b) (iii) and (iv)
(c) (i) and (iii) (d) (ii) and (iii)

41. Read the following statements regarding adaptation and choose the correct option.
(i) Many xerophytic plants have a thick cuticle on leaf epidermis and sunken stomata to prevent transpiration.
(ii) Some xerophytic plants have special photosynthetic pathway (CAM) that enables their stomata to close during day.
(iii) *Opuntias* has no leaves, they are reduced to spines.
(iv) All adaptation are genetically fixed in all organisms.
(v) In *Opuntia*, the pathway of photosynthesis is through C_3 cycle.
(a) (i), (ii) and (iii) (b) Only (ii)
(c) (iv) and (v) (d) All of these

42. Which statement explains the concept of Allen's rule?
(a) Aquatic mammals have blubber as insulator.
(b) Mammals of colder climate have shorter ears and limbs.
(c) Mammals of humid and warmer region have more melanin in their skin.
(d) The bears undergoes hibernation during winter.

43. Mark the incorrect statement.
(a) Many fishes thrive in Antarctic water where temperature is always below zero .
(b) Microbes can survive in hot springs where temperature exceeds 100°C.
(c) Fishes can survive even at a depth where pressure exceeds 100 atm.
(d) Desert lizards have marvelous physiological ability to survive scorching heat of desert.

44. Given below are some examples associated with a type of adaptation.
(i) Basking by desert lizards in sun.
(ii) Hiding in burrows by some animals.
(iii) Wearing of woolen clothes.
(iv) Thermal gaping

Identify the correct option.
(a) Scansorial adaptation (b) Cursorial adaptation
(c) Biochemical adaptation (d) Behavioural adaptation

45. Which of the following are the characteristics of expanding population ?
(i) Pyramid - shaped age structure.
(ii) An urn - shaped age structure.
(iii) Pre-reproductive and reproductive age groups become more or less equal in size.
(iv) Rapidly growing population with high birth rate.
(a) (i) and (iii) (b) (i) and (iv)
(c) (iii) and (iv) (d) (ii) and (iii)

46. Which of the following statement is incorrect regarding predators?
(a) It keeps prey population under control.
(b) It helps in maintaining species diversity.
(c) It reduces intensity of competition among competing prey species.
(d) Predator in nature are prudent because they do not exploit their prey.

47. Which one of the following is categorised as a parasite in true sense?
(a) Human foetus developing inside the uterus draws nourishment from the mother.
(b) The female *Anopheles* bites and sucks blood from humans.
(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.

48. Which of the following is an incorrect statement?
(a) The human liver fluke depends on two intermediate hosts to complete its life cycle.
(b) The malarial parasite needs vector (mosquito to spread to other host).
(c) Parasites that feed on external surface of the host organism are called endoparasites.
(d) *Cuscuta* derives its nutrition from the host plant which it parasitises.

49. Select the incorrect statement.
(a) Overwhelming majority of animals and nearly all plants maintain a constant internal temperature.
(b) An orchid growing as an epiphyte on a mango branch is an example of commensalism.
(c) In brood parasitism, the parasitic bird lays its eggs in the nest of its host and lets the host to incubate them.
(d) In amensalism, one species is harmed whereas the other is unaffected.

ASSERTION/REASON TYPE QUESTIONS

In the following questions, a statement of Assertion is followed by a statement of Reason.
(a) If both Assertion and Reason are true and the Reason is the correct explanation of the Assertion.
(b) If both Assertion and Reason are true but the Reason is not the correct explanation of the Assertion.
(c) If Assertion is true but Reason is false.
(d) If both Assertion and Reason are false.

50. **Assertion :** In sigmoid growth curve, population finally stabilizes itself.
Reason : Finally, the death rate increases than the birth rate.

51. **Assertion :** In a water body, *Daphnia* populations showed distinct variations in their morphology at different seasons.
Reason : Variations in temperature of water bodies at different seasons influences cyclomorphosis in some organisms.

52. **Assertion :** Predation is a type of interspecific interaction with a strategy based on feeding.
Reason : A stable population is maintained through time by the populations of predator and their prey and rarely one population becomes abundant or scarce.

53. **Assertion :** Species are groups of potentially interbreeding natural populations which are isolated from other such groups.
Reason : Distinctive morphological characters are displayed due to reproductive isolation.

54. **Assertion :** Cold blooded animals do not have fat layer.
Reason : Cold blooded animals use their fat for metabolic process during hibernation.

MATCHING TYPE QUESTIONS

55. Match column-I with column-II and choose the correct answer.

	Column-I		Column-II
A.	Pacific Salmon fish	I.	Produces a small number of large sized offspring
B.	Mammals	II.	Produces a large number of small sized offspring
C.	Oysters	III.	Breed only once in their lifetime
D.	Birds	IV.	Breed many times during their lifetime

(a) A – III, B – IV, C – II, D – I
(b) A – I, B – IV, C – II, D – III
(c) A – IV, B – II, C – I, D – III
(d) A – II, B – IV, C – III, D – I

56. Match the following

	Population		Example
A.	Predation	I.	*Cuscuta* and hedge plants
B.	Commensalism	II.	*Balanus* and *Chathamalus*
C.	Parasitism	III.	Cactus and moth
D.	Competition	IV.	Orchid and mango

(a) A – III, B – IV, C – I, D – II
(b) A – IV, B – III, C – II, D – I
(c) A – I, B – III, C – II, D – IV
(d) A – III, B – IV, C – II, D – I

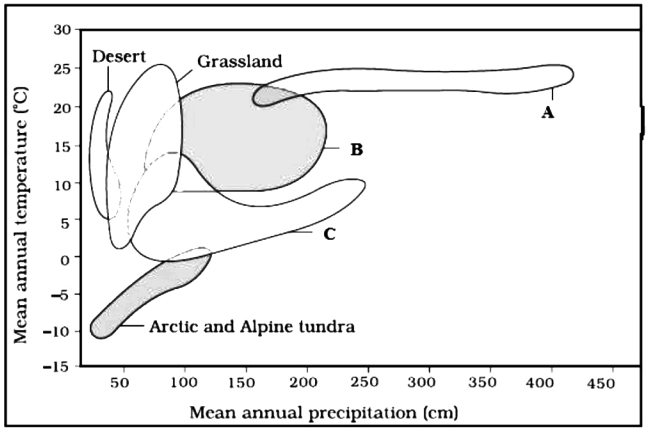
57. Match Column - I with Column - II and choose the correct option.

	Column I		Column II
A.	Pacific salmon fish	I	Verhulst - pearl logistic growth
B.	$N_t = N_0e^{rt}$	II	Breed only once in life time
C.	Oyster	III	Exponential growth
D.	$dN/dt = rN\left[\frac{K-N}{K}\right]$	IV	A large number of small sized offsprings

(a) A – IV; B – III; C – I; D – II
(b) A – III; B – IV; C – I; D – II
(c) A – III; B – I; C – IV; D – II
(d) A – II; B – III; C – IV; D – I

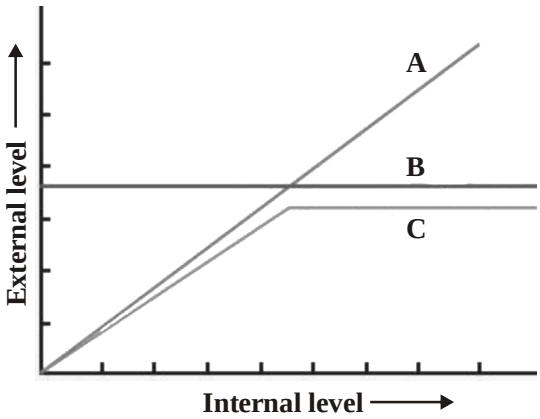
DIAGRAM TYPE QUESTIONS

58. The given figure flows biome distribution with respect to annual temperature and precipitation. In this few parts are marked as A, B & C. Mark the correct identification from the following picture.



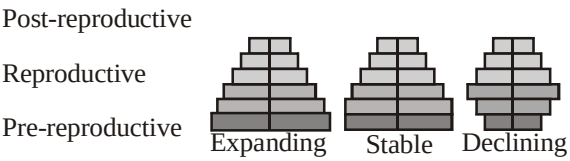
	(A)	(B)	(C)
(a)	Tropical forest	Temperate forest	Coniferous forest
(b)	Temperate forest	Tropical forest	Coniferous forest
(c)	Temperate forest	Coniferous forest	Tropical forest
(d)	Coniferous forest	Tropical forest	Temperate forest

59. The given figure shows the diagram match representation of organismic response. Which option gives the correct identification of three types of organisms (marked as A, B & C) in response to abiotic factor?



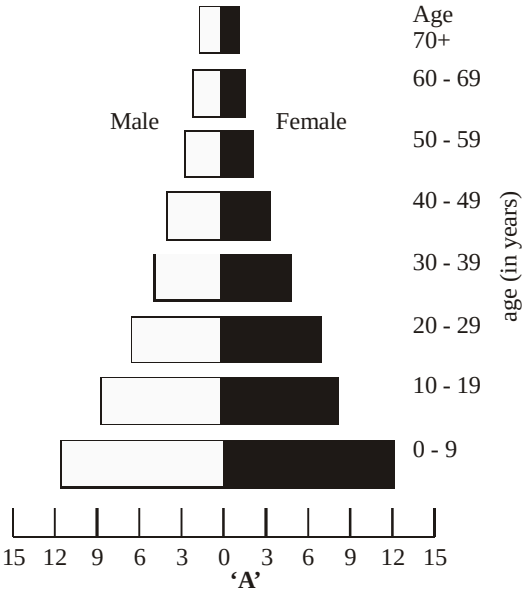
	(A)	(B)	(C)
(a)	Partial regulator	Regulator	Conformers
(b)	Regulator	Conformers	Partial regulator
(c)	Conformers	Regulator	Partial regulator
(d)	Regulator	Partial regulator	Conformers

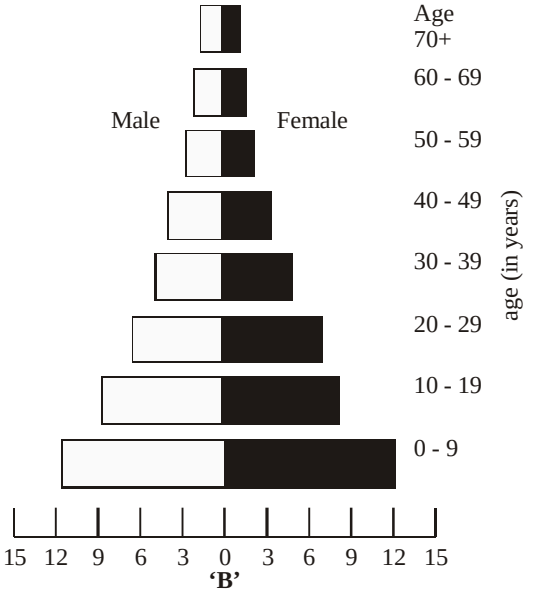
60. What type of human population is represented by the given age pyramid?



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

61. 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.





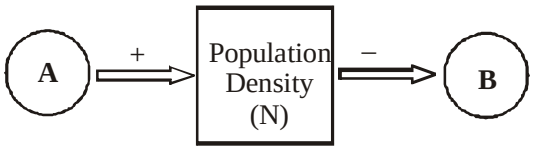
(a) "B" is earlier pyramid and shows stabilized growth rate.

(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.

62. The density of a population in a given habitat during a given period, fluctuates due to changes in four basic processes On this basis choose the correct option to fill up A and B boxes in the given diagram.



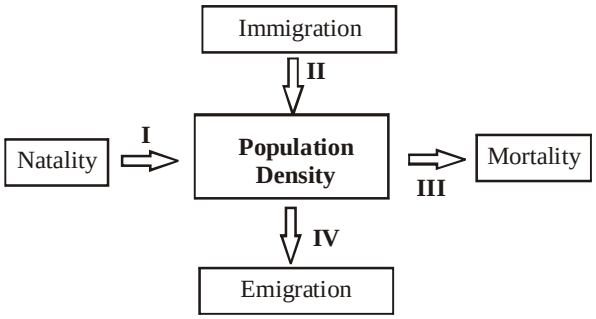
(a) A = Natality + Immigration, B = Mortality + Emigration

(b) A = Natality + Mortality, B = Immigration + Emigration

(c) A = Birth rate + Death rate, B = Mortality + Emigration

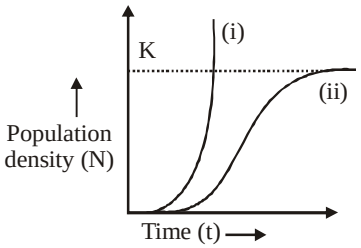
(d) A = Natality + Emigration, B = Mortality + Immigration

63. Identify I to IV which affect the population density.



	I	II	III	IV
(a)	Increase	Decrease	Increase	Decrease
(b)	Decrease	Increase	Decrease	Increase
(c)	Increase	Increase	Decrease	Decrease
(d)	Decrease	Decrease	Increase	Increase

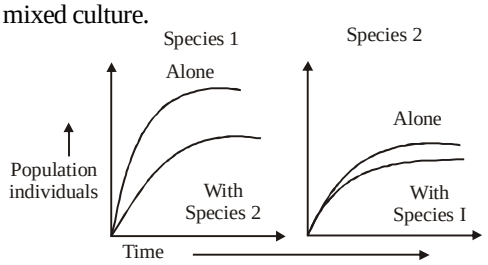
64. Study the population growth curves given below.



Which options is the best for curve (i) and (ii) ?

S. No.	Type of (i) curve	Type of (ii) curve	Equation for curve (i)	Equation for curve (ii)
(a)	Logistic curve	Logistic curve	$\frac{dN}{dt} = rN\left(\frac{K-N}{K}\right)$	$\frac{dN}{dt} = rN$
(b)	Exponential curve	Logistic curve	$\frac{dN}{dt} = rN$	$\frac{dN}{dt} = rN\left(\frac{K-N}{K}\right)$
(c)	Logistic curve	Exponential curve	$\frac{dN}{dt} = rN\left(\frac{K-N}{K}\right)$	$\frac{dN}{dt} = rN$
(d)	Exponential curve	Exponential curve	$\frac{dN}{dt} = rN$	$\frac{dN}{dt} = rN\left(\frac{K-N}{K}\right)$

65. In laboratory experiments, two species of the protist *Paramecium* were grown alone and in the presence of the other species. The following graphs show growth of species 1 (left) and species 2 (right), both along and when in mixed culture.



Interpretation of these graphs shows that

(a) competitive exclusion occurred in these experiments.
(b) both species are affected by interspecific competition but species 1 is less affected.
(c) both species are affected by interspecific competition but species 2 is less affected.
(d) both species are affected equally by interspecific competition.

CRITICAL THINKING TYPE QUESTIONS

66. Which one of the following do not account for the formation of major biomes?
(a) Annual variation in intensity of temperature.
(b) Annual variation in duration of temperature.
(c) Annual variation in precipitation.
(d) Annual variation in texture of soil.

67. Many freshwater fishes cannot live for long in sea water and *vice-versa* mainly because of the
(a) variation in light intensity.
(b) change in the levels of thermal tolerance.
(c) osmosis.
(d) spectral quality of solar radiation.

68. Factors that are important for aquatic organisms include
(a) chemical composition of water
(b) pH of water
(c) spectral quality of solar radiation
(d) both (a) and (b)

69. Many animals use the diurnal and seasonal variations in light intensity and photoperiod as cues timing of
(a) for age only
(b) reproductive activities only
(c) migration only
(d) all of these

70. To a large extent the vegetation in any area is determined by
(a) temperature and pH.
(b) pH, mineral composition and light.
(c) pH, mineral composition and topography.
(d) types of minerals in soil.

71. Regarding temperature and osmotic concentration nearly all plants are
(a) regulator (b) conformers
(c) partial regulator (d) escaper in time

72. Very small animals are rarely found in polar regions because
(a) they have a smaller surface area relative to their volume.
(b) they have a larger volume relative to their surface area.
(c) they have smaller metabolic rate.
(d) they have a larger surface area relative to their volume.

73. The kangaroo rats of North American deserts do not need to drink water because
(a) they meet their water requirement through internal fat oxidation when the water is a byproduct.
(b) they are able to concentrate urine, to minimize water loss.
(c) they do not have sweat glands.
(d) all of the above

74. Many tribes living in the high altitude of Himalayas have a
(a) higher WBC count than people living in the plains.
(b) lower WBC count than people living in the plains.
(c) higher RBC count than people living in the plains.
(d) lower RBC count than people living in the plains.

75. Population ecology is an important area of ecology because
(a) it determines the interaction among organisms and between the organisms and its physical environment.
(b) evolutionary changes through natural selection take place at the population level.
(c) it links ecology to population genetics and evolution.
(d) it links different types of communities together.

76. Natural selection operates to evolve the desired tracts at
(a) cellular level (b) species level
(c) community level (d) population level

77. If in a pond, there were 20 lotus last year and through reproduction 8 new plants are added, taking current population to 28, the birth rate per year is
(a) 0.2 (b) 0.4
(c) 0.6 (d) 0.8

78. If 4 individuals in a laboratory population of 40 fruitflies died during a specified time interval (*i.e.*, a week), the death rate in the population during that period is
(a) 1 (b) 0.1
(c) 0.01 (d) 0.4

79. In an age pyramid, the number of individuals of reproductive age is lesser than pre-reproductive but higher than post reproductive ones. The population is
(a) growing (b) declining
(c) stable (d) can not be predicted

80. The age structure of a population influences population growth because
(a) younger females have more offsprings than do older females.
(b) different age groups have different reproductive capabilities.
(c) the more individuals that are immature the slower the population will grow.
(d) a shorter generation time results in slower population growth.

81. If N is the population density at time t, then its density at time t + 1 is
(a) $N_{t+1} = N_t + [(B + I) + (D + E)]$
(b) $N_{t+1} = N_t - [(B + I) + (D + E)]$
(c) $N_{t+1} = N_t + [(B + I) - (D + E)]$
(d) $N_{t+1} = N_t - [(B + I) - (D + E)]$

82. The two basic processes which contribute to a increase in population density are
(a) mortality and immigration
(b) natality and immigration
(c) mortality and emigration
(d) mortality and emigration

83. The integral form of the exponential growth equation is
(a) $N_t = N_0 e^{-rt}$ (b) $N_0 = N_t e^{rt}$
(c) $N_t = N_0 e^{rt}$ (d) $rN = N_t e^{rt}$

84. Assume that you have been studying a population of cattails at the edge of a pond. After 10 years of observations, you notice that the population has remained steady. What is the most likely explanation?
(a) The birth rate and death rate are both increasing at the same rate.
(b) The pond is drying up.
(c) The carrying capacity of pond has been reached.
(d) Nutrients levels in pond are fluctuating.

85. Organisms with very high intrinsic growth rates have
(a) long generation times.
(b) short generation times.
(c) no courtship behaviour.
(d) no carrying capacities.

86. In exponential growth, the increase or decrease in population size during a unit period is
(a) (B + I) – (D + E)
(b) (b + d) – N
(c) N × (b – d)
(d) r + N

87. When certain exotic species are introduced into geographical area, they become invasive and start spreading fast because
(a) they have high reproductive rate.
(b) they produce chemicals to inhibit the growth of other organisms.
(c) there is no competition.
(d) the invaded land does not have its natural predators.

88. Which of the following adaptation do not lessen the impact of predation?
(a) Some species of insects and frogs are *camouflaged*.
(b) Some animals are poisonous.
(c) Monarch butterfly is highly distasteful due to having certain chemical in their bodies.
(d) Different feeding habits of finches.

89. Mac Arthur observed that five closely related species of Warblers living on the same tree were able to avoid competition and co-exist due to
(a) cooperation in their foraging efforts.
(b) behavioural differences in their foraging activities.
(c) different kinds of insects they eat.
(d) all of the above

90. The Abingdon tortoise in Galapagos Islands became extinct within a decade after goats were introduced on the island. This is apparently due to
(a) lower intrinsic rate of goat.
(b) the greater browsing efficiency of the goats.
(c) limiting resource.
(d) superiority of the goat.

91. Gause's 'competitive exclusion principle' states that
(a) humans are the most widespread agents of disturbance.
(b) in a competition for similar resource both the participants are benefitted.
(c) in a competition, both the participants are excluded.
(d) two closely related species competing for the same resources cannot co-exist indefinitely and competitively inferior one will be eliminated eventually.

Hints & Solutions

Chapter 35 : Organisms and Populations

1. (d) Precipitation is any form of any water (such as rain, dew, snow, sleet or hail) formed by condensation of water vapour in the atmosphere and falls to the earth's surface.

2. (d) Temperature, water, light and soil are non - living abiotic factors which affect plants and animal species in an environment. These factors play an important role in leading variations in the physical or chemical conditions of different habitats.

3. (a) Stenothermal organisms are those organisms which are capable to live or survive within a limited range of temperature.

4. (b) Eurythermal organisms are those organisms which are capable to live or survive within a wide range of temperature in the environment.

5. (b) Sea water typically has a salinity of around 35 g/kg although lower values are typical near coasts where rivers enter the ocean. Rivers and lakes can have a wide range of salinities, from less than 0-0.1 g/kg to a few g/kg, although there are many places where even higher salinities are found. The dead sea has a salinity of more than 200 g/kg.

6. (d) Stenohaline organisms are incapable to withstand wide variation in salinity of the surrounding water.

7. (c) Deep inside the oceans, the environment is continuously dark and its inhabitants are not aware of the existence of a celestial source of energy called sun.

8. (d) Water holding capacity is the amount of water held between field capacity and wilting point. Accessible water is held in soil pores via forces which depend on the pore size and the surface tension of water. The closer together soil particles or aggregates are, the smaller the pores and the stronger the force holding water in the soil. Because the water in large pores is held with little force, it drains most readily. Likewise, plants absorb soil water from the larger pores first because it takes less energy to pull water from large pores than from small pores. Therefore water holding capacity is dependent on the soil composition, grain size and aggregation.

9. (a) The benthic community is made up of organisms that live in and on the bottom of the ocean floor. These organisms are known as benthos. Benthos include worms, clams, crabs, lobsters, sponges, and other tiny organisms that live in the bottom sediments.

10. (a) Homeostasis is the property of a system that regulate its interval and tends to maintain a stable relatively constant conditions of properties such as temperature or pH.

11. (d) Diapause is a period during which growth or development is suspended and physiological activity is diminished, as in certain insects in response to adverse environmental conditions.

12. (c) Aestivation is the cessation or slowing of metabolic activity during the summer period to avoid problems of heat and desiccation etc.

13. (c) Adaptation is an outcome of natural selection. It is a process in which animal or plant species can adapt to a certain environment by adjusting themselves in great varieties of ways to survive and reproduce in that particular habitat.

14. (d) Blubber is the fatty layer present between the skin and muscle of whales and other cetaceans. It acts as an insulator and protects the animal from heat loss and serves as a food reserve.

15. (b) Archaebacteria is a group of microorganisms (like methanogens and certain halophiles and thermacidophiles) which flourishes in hot springs and deep sea hydrovents where temperatures exceed 100ºC.

16. (d) Age pyramids are graphical representations that show the distribution of various age groups in a population which forms the shape of a pyramid of a growing population. It determines the overall age distribution of a population, an indication of the reproductive capabilities and likelihood of the continuation of a species.

17. (b) The age of pyramid with narrow base indicates a low percentage of young individuals. If the birth rate is drastically reduced, the pre-reproductive group dwindles in proportion to the other two groups and it results in an urn-shaped pyramid, which indicates that population is dying off.

18. (c) Population growth is the increase in the number of individuals in a population. Natality, immigration, mortality and emigration are the processes which affect the density of population in a given habitat during a given period of time. The former two processes contribute an increase in population density whereas the latter two processes to a decrease.

19. (d) Emigration may be defined as the movement of individuals from one place to another to establish permanent or temporary habitation.

20. (c) A population growing in a habitat with limited resources show initially a lag phase, followed by phases of acceleration and deceleration and finally an asymptote, when the population density reaches the carrying capacity. A plot of N in relation to time (t) results in a sigmoid curve. This type of curve is called verhulst pearl logistic curve.

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

where, N = Population density at time 't'
r = intrinsic rate of natural increase
K = carrying capacity

21. (c) In growth pattern, environmental resistance (**1** - N/K) is the action of limiting abiotic and biotic factors that prohibit the growth of a population as it would grow according to its biotic potential.

22. (c) Interspecific interaction arise from the interaction of populations of two different species. They could be beneficial, detrimental or neutral (neither harm nor benefit) to one of the species or both.

23. (c) Thorns of *Acacia* and cactus are the most common morphological means of defence.

24. (d) Secondary compounds produced by plants are toxic or repellent to herbivores and microbes, and help defend plants producing them. Production increases when a plant is attacked by herbivores or pathogens. Strychnine, caffeine and quinine are some secondary metabolites which help them against grazers and browsers.

25. (b) Competitive release is the growth of the species range when a competitor for its niche is eliminated. It usually occurs when one of two species competing for the same resource disappears, thereby allowing the remaining competitor to utilize the resource more fully than it could in the presence of the first species. Joseph Connell's (1961) demonstrates competitive release for study of competition for space between the barnacle species *Balanus* and *Chathamalus* in the intertidal zone on the rocky Scottish coast.

26. (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.

27. (c) Brood parasitism is a type of social parasitism in which eggs are laid in the nests of other birds, causing them to be hatched and the young raised by the hosts, regularly at the cost of the hosts' own young. Examples include cuckoos and cowbirds.

28. (c) Commensalism is a symbiotic association between two organisms in which one benefits and the other derives neither benefit nor harm. Some of these include clownfish and sea anemones, fleas and dogs, sharks and remoras, and epiphyte/orchid on mango branch. Association between liver flukes and tapeworms is a type of endosymbiosis in which one symbiont lives within the body of another.

29. (d) Interaction between two species, where both suffer adverse effects is known as competition. Competition is the relationship in which each population adversely affects the other in the struggle for resources short in supply.
Competition is of two types – interspecific and intraspecific.
(a) **Interspecific competition** occurs between two individuals of two different species occurring in a habitat.
(b) **Intraspecific competition** occurs between individuals of the same species.

30. (d) Mutualism is a symbiotic association between two species of organisms in which both the species benefit and takes advantages from each other and cannot survive without each other. Fig wasps are the sole pollinators of fig flowers/trees and in turn, fig wasps can breed nowhere else but inside figs.

31. (c) In amensalism, one species is inhibited by toxic secretion of another species. Inhibitor species is neither benefitted nor harmed.

32. (b) A: Lichen represents an intimate mutualistic (i) relationship between a fungus and cyanobacteria (ii).
B: The mycorrhizae (iii) are the associations between fungi and roots of higher plants.
C: Plants needs the help of animals (iv) for pollinating their flowers and dispersing their seeds.
D: The wasp (v) pollinates the fig inflorescence while searching for suitable egg laying sites.

33. (b)

34. (c) Abiotic components are physical factors which affect the structure, behaviour and life history of organisms. These components (such as soil, moisture, range of temperature, and availability of light) along with biotic factors (such as the availability of food and the presence of predators) can characterise the habitat of an organism.

35. (c) Abiotic factor (which include water, sunlight, oxygen, soil and temperature) are the non-living parts of the environment that can have a major influence on living organisms. Temperature is strongly influenced by sunlight and plays an important role for animals that cannot regulate their own body temperature. A few organisms can tolerate and

flourish in wide range of temperature and few organisms are limited to narrow range of temperature. And this level of thermal tolerance of different species determines their geographical distribution to a large extent. Therefore, temperature is responsible for all the given statements.

(i) Mango trees cannot grow in temperate countries like Canada and Germany.

(ii) Tuna fish are rarely caught beyond tropical latitude in the ocean.

(iii) Snow leopard is not found in Kerala forest

36. (b) Statement (i) and (iv) are incorrect.
(i) Temperature progressively increases from pole to equator. (iv) Temperature ranges from sub-zero levels in polar areas and high altitudes to >50ºC in tropical deserts in summer.

37. (d) An overexposure to UV-B radiation can cause sunburn and some form of skin cancer. In humans, prolonged exposure to solar UV-radiation may result in acute and chronic health effects on the skin, eye and immune system. Moreover, UV-C can cause adverse effects that can variously be mutagenic or carcinogenic.

38. (d) Plants donot have mechanism of thermoregulation to maintain that internal temperatures.

39. (d) Small animals have a large surface area relative to their volume. They tend to lose body heat very fast when it is cold outside; then they have to spend much energy to generate body heat through metabolism. This is the main reason why very small animals are rarely found in polar regions. Hibernation is a time when animals 'sleep' through cold weather. The familiar case of bears going into hibernation during winter is an example of escape in time.

40. (c) Thermoregulation is energetically expensive for many organisms particularly true for small animals like shrews and humming birds. During the course of evolution, the costs benefits of maintaining a constant internal environment are taken into consideration.

41. (a) Statements (i), (ii) and (iii) are correct.

(iv) All adaptation are not genetically fixed in all organisms.

(v) In *Opuntia*, the pathway of photosynthesis is through C_4 cycle.

42. (b) Allen's rule states that the limbs, ears, and other appendages of the animals living in cold climates tend to be shorter than in animals of the same species living in warm climates. Shorter and more compact body parts have less surface area than elongated ones and thus radiate less body heat.

43. (d) Desert lizards lack the physiological ability that mammals love 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.

44. (d) The given examples show behavioural adaptations. Behavioural adaptation is the process by which an organism or a species changes its pattern of action to better suit its environment.

45. (b) Expanding population is a population containing a large proportion of young individuals. Pyramid shaped age structure and urn shaped age structure are the characteristics of expanding population.

46. (d) Predator is an organism that exists by preying upon other organisms. Predator in nature is prudent (means sensible) because they do not exploit their prey. Such predator would maintain the prey population at the density that gives the maximum rate of production of new prey biomass.

47. (c) Head louse living on the human scalp as well as laying egg on human hair is categorised as a parasite because they survive by living on human scalp by taking nourishment from there.

48. (c) Parasites that feed on the external surface of the host organism are called ectoparasites. The most familiar examples of this group are the lice on humans and ticks on dogs.

49. (a) Statement (a) is incorrect. An overwhelming majority (around 99 percent) of animals and nearly all plants cannot maintain a constant internal temperature.

50. (c) In sigmoid growth curve, finally, growth rate becomes stable because mortality and natality rates become equal to each other and finally the population shows zero growth rate as birth rate equals death rate.

51. (a) Cyclomorphosis, or cyclic change in morphology is observed. The morphology is Dependent upon variation of temperature in water so, *Daphnia* shows different morphology in different seasons.

52. (a) The interaction between predator and prey is interspecific. Predator population usually depends upon the number of prey which in turn is controlled by predators.

53. (b) A group of individuals resembling each other in morphological, physiological, biochemical and behavioural characters constitute a species such individuals can breed among themselves but cannot breed with members other than their own to produce fertile offsprings. New species are formed mainly due to reproductive isolation.

54. (a) Cold blooded organisms utilize their stored food at the time of hibernation and aestivation.

55. (a)

56. (a) Predation is a relation between two organisms in which one organism captures and feeds on other.

Commensalism is a relation between two organisms in which one benefits and the other derives neither benefit nor harms. Parasitism is a relation between organisms in which one lives as a parasite on another and harm the host. Competition is process in which the fitness and survival ability of one species is significantly lower in the presence of another species.

57. (d)

58. (a) In the given figure of biome distribution with respect to annual temperature and precipitation, the parts marked as A, B and C is respectively tropical forest, temperate forest and coniferous forest. A tropical forest is found in areas with high average temperature and significant amount of rain fall. This forest consists of a completely closed canopy of trees that prevents penetration of sunlight to the ground. The temperate forests are found in rather mild climatic area within the temperate zone that receives heavy rainfall and usually includes numerous kinds of trees. Coniferous forest is a terrestrial biome found in temperate regions of the world with warm summers and cool winters and adequate rainfall to sustain a forest.

59. (c) In the given figure of organismic response, the types of organism in response to abiotic factors marked as A, B and C are respectively conformers, regulator and partial regulator.

60. (d) The given age pyramid represents the declining population of humans. It is an Urn shaped pyramid with least number of pre-reproductive individuals. Low birth rate, stable death rate and increased immigrations can lead to declining population of humans.

61. (d) 'A' is more recent and shows slight reduction in growth rate.

62. (a) Population density due to changes in the following basic process - A: Natality + Immigration; B: Mortality + Emigration

Natality is the proportion of births to the total population in a place in a given time. Immigration is the number of individuals of the same species that have come into the habitat from elsewhere during the time period under consideration. Mortality is the number of deaths in the population during a given period of time. Emigration is the number of individuals of the population who left the habitat and have gone elsewhere during a given period of time.

63. (c) According to the given figure, I, II, III and IV (which affects the basic process of population density) are respectively increase, increase, decrease and decrease.

64. (b) **65. (c)**

66. (d) Soil moisture, soil nutrients and length of growing season affect what kinds of plants can grow in a place and what kinds of organisms the biomes can sustain. Along with temperature and precipitation, these are factors that distinguish one biome from another and influence the dominant types of vegetation and animals that have adapted to a biome's unique characteristics.

67. (c) Many freshwater fishes cannot live for long in sea-water and *vice-versa* mainly because of osmosis. Freshwater fishes are adapted to reduce the amount of water reaching into their bodies. Freshwater fish differ physiologically from salt water fish in several aspects. Their gills must be able to diffuse water while simultaneously keeping the salts of the bodily fluids inside. The scales of the fish also play a part in the process; freshwater fish that have lost too many scales get a surplus of water diffused in through the skin, causing the fish to die.

68. (d) Chemical composition of water and pH of water are the factors that are important for aquatic organisms.

69. (d)

70. (c) pH, mineral composition and topography are the important factors which determine to a large extent of vegetation in an area.

71. (b) Regarding temperature and osmotic concentration nearly all plants are conformers. Conformers are those organisms whose internal conditions are controlled primarily by environmental conditions.

72. (d) Very small animals are rarely found in polar regions because they have a larger surface area relative to their volume.

73. (d) The Kangaroo rats of North American deserts do not need to drink water because of the following reasons, like- they meet their water requirements through internal oxidation fats when water is a byproduct, they are able to concentrate their urine thereby minimizing the loss of water from their body and also they do not have sweat glands so no perspiration occurs in the animals.

74. (c) At the high altitudes, the atmospheric pressure of O_2 will be too low so the solubility of oxygen in the blood will be very less hence the oxygen carried by each RBC will be too less. But to fulfill the oxygen requirement of the body blood has to carry more oxygen to the body tissue and this is done by the increased number of RBCs.

75. (c) Population ecology is the branch of ecology that studies the structure and dynamics of populations. Population ecology is an important area of ecology because it links ecology of population genetics and evolution.

76. (d) Natural selection operates to evolve the desired traits at population level, because it is the organisms only which has to cope with a changed environment. Therefore, population ecology links ecology to population genetics and evolution.

77. (b) Birth rate or natality rate is a measure of the extent to which a population replenishes itself through births.

$$\text{Birth rate} = \frac{\text{No. of births}}{\text{Total population}}$$

$$= \frac{8}{20} = 0.4 \text{ offspring per lotus per year}$$

78. (b) Mortality or death rate refers to the death of individuals in a population.

$$\text{Death rate} = \frac{\text{No. of deaths}}{\text{Total population}}$$

$$= \frac{4}{40} = 0.1 \text{ individuals per fruitfly per week}$$

79. (a) When in an age pyramid, the number of individuals of reproductive age is lesser than pre - reproductive but higher than post - reproductive ones, then it shows that population is growing.

80. (b) Age distribution is important, as it influences both, natality and mortality of the population. From an ecological view point there are three major ecological ages (age groups) in any population. These are-pre-reproductive, reproductive and post-reproductive. The relative duration of these age groups in proportion to the life span varies greatly with different organisms.

81. (c) Population density will increase if the number of births plus the number of immigrant (B + I) is more than the number of deaths plus the number of emigrants (D + E), otherwise it will decrease. Births and deaths are the most important factors influencing population density.

82. (b) Natality and immigration are the two basic process which contribute to an increase in population density. Natality is the proportion of births to the total population in a place in a given time. Immigration is the number of individuals of the same species that have come into the habitat from elsewhere during the time period under consideration.

83. (a) The integral form of the exponential growth equation is $\mathbf{N_t = N_0\, e^{-rt}}$

where,

N_t = Population density after time t.

N_0 = Population density at time zero.

r = intrinsic rate of natural increase.

e = the base of natural logarithms (2.71828).

The equation describes the exponential or geometric growth pattern of a population and results in a J-shaped curve. The J-shaped curve of exponential growth is characteristic of some population that are introduced into a new or unfilled environment or whose numbers have been drastically reduced by a catastrophic event and are rebounding.

84. (c) Carrying capacity of a population in any environment is the maximum population size of that particular species that the environment can tolerate indefinitely, given the food, habitat, water, and other necessities available in the environment.

85. (b) The intrinsic rate of increase is inversely related to generation time, T. Therefore, organisms with very high intrinsic growth rates have short generation time.

86. (c) In exponential growth, the increase or decrease in population size during a unit period is $N \times (b - d)$.

87. (d) Exotic species when introduced into the environment where they are not native, they become invasive and start spreading fast because the invaded land does not have their natural predators.

88. (d) Different feeding habit of finches does not lessen the impact of predation.

89. (b) This type of mechanism is known as resource partitioning. If two species compete for the same resource, they could avoid competition by choosing, for instance, different times for feeding or different foraging patterns.

90. (b) The Abingdon tortoise in Galapagos Island became extinct within a decade after goats were introduced on the islands, apparently due to the greater browsing efficiency of the goats. The whole incidence shows the process of competition among the species.

91. (d) Gause's principle states that similar species cannot coexist for long in the same ecological niche because competing for the same critical resources within an environment, one of them will eventually outcompete and displace the other.