

CHAPTER - 13

ORGANISMS AND POPULATIONS

Fill in the blanks

1. Ecology is basically concerned with four levels of biological organisation - _____, _____, _____ and _____.
2. The rotation of our planet around the Sun and the tilt of its axis cause annual variations in the _____ of temperature, resulting in distinct seasons.
3. The formation of major biomes such as _____, _____ and _____.
4. On planet Earth, life exists not just in a few favourable habitats but even in extreme and harsh habitats - scorching _____, perpetually _____ Meghalaya forests, deep ocean trenches, _____ streams.
5. _____ is the most important ecologically relevant environmental factor.
6. The average temperature on land varies seasonally, decreases progressively from the _____ towards the _____ and from _____ to the _____ tops.
7. A few organisms can tolerate and thrive in a wide range of temperatures (they are called _____), but, a vast majority of them are restricted to a narrow range of temperatures (such organisms are called _____).
8. _____ is the most important factor influencing the life of organisms.
9. The salt concentration (measured as salinity in parts per thousand), is less than _____ in inland waters, _____ in the sea and _____ in some hypersaline lagoons.
10. Many plants are also dependent on _____ to meet their photoperiodic requirement for flowering.
11. The environment is perpetually dark and its inhabitants are not aware of the existence of a celestial source of energy called _____.
12. The organism should try to maintain the constancy of its internal environment (a process called _____).
13. _____ some organisms are able to maintain homeostasis by physiological (sometimes behavioural also) means which ensures constant body temperature, constant osmotic concentration, etc.
14. All birds and mammals, and a very few lower vertebrate and invertebrate species are indeed capable of such regulation (_____ and _____).
15. When outside temperature is more than our body temperature, we _____ profusely.
16. _____ an overwhelming majority (99 per cent) of animals and nearly all plants cannot maintain a constant internal environment.
17. Heat loss or heat gain is a function of _____.
18. Small animals have a _____ surface area relative to their volume, they tend to lose body heat very _____ when it is cold outside; then they have to expend much energy to generate body heat through metabolism.
19. _____ the organism can move away temporarily from the stressful habitat to a more hospitable area and return when stressful period is over.
20. Every winter the famous Keolado National Park (Bharatpur) in _____ host thousands of migratory birds coming from _____ and other extremely cold northern regions.
21. Bears going into _____ during _____ is an example of escape in time.



22. Snails and fish go into _____ to avoid summer-related problems-heat and desiccation.
23. _____ is any attribute of the organism (morphological, physiological, behavioural) that enables the organism to survive and reproduce in its habitat.
24. Mammals from colder climates generally have shorter ears and limbs to minimise heat loss. (This is called the _____ Rule.)
25. Any high altitude place (>3,500m Rohtang Pass near Manali and Mansarovar, in China occupied Tibet) you must have experienced what is called _____ sickness.
26. There are microbes (_____) that flourish in hot springs and deep sea hydrothermal vents where temperatures far exceed 100°C.
27. _____ ecology is, therefore, an important area of ecology because it links ecology to population genetics and evolution.
28. An individual may have births and deaths, but a population has _____ and _____.
29. If the age distribution (per cent individuals of a given age or age group) is plotted for the population, the resulting structure is called an _____.
30. The shape of the pyramids reflects the growth status of the population - (a) whether it is _____, (b) _____ or (c) _____.
31. _____ refers to the number of births during a given period in the population that are added to the initial density.
32. _____ is the number of deaths in the population during a given period.
33. _____ is the number of individuals of the same species that have come into the habitat from elsewhere during the time period under consideration.
34. _____ is the number of individuals of the population who left the habitat and gone elsewhere during the time period under consideration.
35. $\frac{dN}{dt} = rN$ The r in this equation is called the '_____ of natural increase'.
36. The magnitude of r values, for the Norway rat the r is _____, and for the flour beetle it is _____.
37. A plot of N in relation to time (t) results in a sigmoid curve. This type of population growth is called _____ Growth.
38. Populations evolve to maximise their reproductive fitness, also called _____ (high r value), in the habitat in which they live.
39. Some organisms breed only once in their lifetime (Pacific _____) while others breed many times during their lifetime (most birds and mammals).
40. Some produce a large number of small-sized offspring (_____) while others produce a small number of large-sized offspring (birds, mammals).
41. Interaction _____ has species A + and species B +.
42. Interaction _____ has species A - and species B -.
43. Interaction _____ has species A + and species B -.
44. Interaction _____ has species A + and species B 0.
45. Interaction _____ has species A + and species B 0.
46. Interaction _____ has species A - and species B 0.
47. The prickly pear _____ introduced into Australia in the early 1920's caused havoc by spreading rapidly into millions of hectares of rangeland.
48. _____ control methods adopted in agricultural pest control are based on the ability of the predator to regulate prey population.



49. In the rocky intertidal communities of the American Pacific Coast the starfish _____ is an important predator. In a field experiment, when all the starfish were removed from an enclosed intertidal area, more than 10 species of invertebrates became extinct within a year.
50. Some species of _____ and _____ are cryptically-coloured (camouflaged) to avoid being detected easily by the predator.
51. The _____ butterfly is highly distasteful to its predator (bird) because of a special chemical present in its body.
52. Nearly _____ per cent of all insects are known to be phytophagous (feeding on plant sap and other parts of plants).
53. Thorns (_____, _____) are the most common morphological means of defence.
54. The weed Calotropis growing in abandoned fields. The plant produces highly poisonous _____ and that is why you never see any cattle or goats browsing on this plant.
55. When Darwin spoke of the struggle for existence and survival of the fittest in nature, he was convinced that _____ competition is a potent force in organic evolution.
56. Shallow South American lakes, visiting _____ and resident fishes compete for their common food, the zooplankton in the lake.
57. The _____ tortoise in Galapagos Islands became extinct within a decade after goats were introduced on the island.
58. Connell's elegant field experiments showed that on the rocky sea coasts of _____, the larger and competitively superior barnacle _____ dominates the intertidal area, and excludes the smaller barnacle _____ from that zone.
59. _____ Principle' states that two closely related species competing for the same resources cannot co-exist indefinitely and the competitively inferior one will be eliminated eventually.
60. One such mechanism is '_____ 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.
61. MacArthur showed that _____ closely related species of warblers living on the same tree were able to avoid competition and co-exist due to behavioural differences in their foraging activities.
62. _____ considering that the parasitic mode of life ensures free lodging and meals, it is not surprising that parasitism has evolved in so many taxonomic groups from plants to higher vertebrates.
63. Many parasites have evolved to be host-specific (they can parasitise only a single species of host) in such a way that both host and the parasite tend to _____.
64. Parasites evolved special adaptations such as the loss of unnecessary _____, presence of adhesive organs or _____ to cling on to the host, loss of digestive system and _____ reproductive capacity.
65. The life cycles of parasites are often complex, involving one or two intermediate hosts or vectors to facilitate parasitisation of its _____ host.
66. The human liver fluke (a trematode parasite) depends on _____ intermediate hosts (a snail and a fish) to complete its life cycle.
67. The malarial parasite needs a vector (_____) to spread to other hosts.
68. Parasites that feed on the external surface of the host organism are called _____. The most familiar examples of this group are the _____ on humans and _____ on dogs.
69. _____, a parasitic plant that is commonly found growing on hedge plants, has lost its chlorophyll and leaves in the course of evolution.



70. _____ are those that live inside the host body at different sites (liver, kidney, lungs, red blood cells, etc.).
71. _____ in birds is a fascinating example of parasitism in which the parasitic bird lays its eggs in the nest of its host and lets the host incubate them.
72. This is the interaction in which one species _____ and the other is neither _____ nor _____.
73. An orchid growing as an epiphyte on a _____ branch, and _____ growing on the back of a whale benefit while neither the mango tree nor the whale derives any apparent benefit.
74. The cattle egret and grazing cattle in close association, a sight you are most likely to catch if you live in farmed rural areas, is a classic example of _____.
75. The Mediterranean orchid _____ employs 'sexual deceit' to get pollination done by a species of _____.
76. The male bee is attracted to what it perceives as a female, '_____' with the flower, and during that process is dusted with pollen from the flower.

: ANSWER KEY :

1. Ecology is basically concerned with four levels of biological organisation – **organisms, populations, communities** and **biomes**.
2. The rotation of our planet around the Sun and the tilt of its axis cause annual variations in the **intensity and duration** of temperature, resulting in distinct seasons.
3. The formation of major biomes such as **desert, rain forest** and **tundra**.
4. On planet Earth, life exists not just in a few favourable habitats but even in extreme and harsh habitats – scorching **Rajasthan desert**, perpetually **rain-soaked** Meghalaya forests, deep ocean trenches, **torrential** streams.
5. **Temperature** is the most important ecologically relevant environmental factor.
6. The average temperature on land varies seasonally, decreases progressively from the **equator** towards the **poles** and from **plains** to the **mountain** tops.
7. A few organisms can tolerate and thrive in a wide range of temperatures (they are called **eurhythermal**), but, a vast majority of them are restricted to a narrow range of temperatures (such organisms are called **stenothermal**).
8. **Water** is the most important factor influencing the life of organisms.
9. The salt concentration (measured as salinity in parts per thousand), is less than **5** in inland waters, **30-35** in the sea and **> 100** in some hypersaline lagoons.
10. Many plants are also dependent on **sunlight** to meet their photoperiodic requirement for flowering.
11. The environment is perpetually dark and its inhabitants are not aware of the existence of a celestial source of energy called **Sun**.
12. The organism should try to maintain the constancy of its internal environment (a process called **homeostasis**).
13. **Regulate** some organisms are able to maintain homeostasis by physiological (sometimes behavioural also) means which ensures constant body temperature, constant osmotic concentration, etc.
14. All birds and mammals, and a very few lower vertebrate and invertebrate species are indeed capable of such regulation (**thermoregulation** and **osmoregulation**).
15. When outside temperature is more than our body temperature, we **sweat** profusely.
16. **Conform** an overwhelming majority (99 per cent) of animals and nearly all plants cannot maintain a constant internal environment.
17. Heat loss or heat gain is a function of **surface area**.
18. Small animals have a **larger** surface area relative to their volume, they tend to lose body heat very **fast** when it is cold outside; then they have to expend much energy to generate body heat through metabolism.
19. **Migrate** the organism can move away temporarily from the stressful habitat to a more hospitable area and return when stressful period is over.
20. Every winter the famous Keolado National Park (Bharatpur) in **Rajasthan** host thousands of migratory birds coming from **Siberia** and other extremely cold northern regions.
21. Bears going into **hibernation** during **winter** is an example of escape in time.
22. Snails and fish go into **aestivation** to avoid summer-related problems-heat and dessication.
23. **Adaptation** is any attribute of the organism (morphological, physiological, behavioural) that enables the organism to survive and reproduce in its habitat.



24. Mammals from colder climates generally have shorter ears and limbs to minimise heat loss. (This is called the **Allen's Rule**.)
25. Any high altitude place (>3,500m Rohtang Pass near Manali and Mansarovar, in China occupied Tibet) you must have experienced what is called **altitude** sickness.
26. There are microbes (**archaeobacteria**) that flourish in hot springs and deep sea hydrothermal vents where temperatures far exceed 100°C.
27. **Population** ecology is, therefore, an important area of ecology because it links ecology to population genetics and evolution.
28. An individual may have births and deaths, but a population has **birth rates** and **death rates**.
29. If the age distribution (per cent individuals of a given age or age group) is plotted for the population, the resulting structure is called an **age pyramid**.
30. The shape of the pyramids reflects the growth status of the population - (a) whether it is **growing**, (b) **stable** or (c) **declining**.
31. **Natality** refers to the number of births during a given period in the population that are added to the initial density.
32. **Mortality** is the number of deaths in the population during a given period.
33. **Immigration** is the number of individuals of the same species that have come into the habitat from elsewhere during the time period under consideration.
34. **Emigration** is the number of individuals of the population who left the habitat and gone elsewhere during the time period under consideration.
35. $DN/dt = rN$ The r in this equation is called the '**intrinsic rate** of natural increase'
36. The magnitude of r values, for the Norway rat the r is **0.015**, and for the flour beetle it is **0.12**.
37. A plot of N in relation to time (t) results in a sigmoid curve. This type of population growth is called **Verhulst-Pearl Logistic Growth**.
38. Populations evolve to maximise their reproductive fitness, also called **Darwinian fitness** (high r value), in the habitat in which they live.
39. Some organisms breed only once in their lifetime (Pacific **salmon fish**, **bamboo**) while others breed many times during their lifetime (most birds and mammals)
40. Some produce a large number of small-sized offspring (**Oysters**, **pelagic fishes**) while others produce a small number of large-sized offspring (birds, mammals).
41. Interaction **Mutualism** has species A + and species B +.
42. Interaction **Competition** has species A - and species B -.
43. Interaction **Predation** has species A + and species B -.
44. Interaction **Parasitism** has species A + and species B -.
45. Interaction **Commensalism** has species A + and species B 0.
46. Interaction **Amensalism** has species A - and species B 0.
47. The prickly pear **cactus** introduced into Australia in the early 1920's caused havoc by spreading rapidly into millions of hectares of rangeland.
48. **Biological** control methods adopted in agricultural pest control are based on the ability of the predator to regulate prey population.
49. In the rocky intertidal communities of the American Pacific Coast the starfish **Pisaster** is an important predator. In a field experiment, when all the starfish were removed from an enclosed intertidal area, more than 10 species of invertebrates became extinct within a year.



50. Some species of insects and frogs are cryptically-coloured (camouflaged) to avoid being detected easily by the predator.
51. The Monarch butterfly is highly distasteful to its predator (bird) because of a special chemical present in its body.
52. Nearly 25 per cent of all insects are known to be phytophagous (feeding on plant sap and other parts of plants).
53. Thorns (Acacia, Cactus) are the most common morphological means of defence.
54. The weed Calotropis growing in abandoned fields. The plant produces highly poisonous cardiac glycosides and that is why you never see any cattle or goats browsing on this plant.
55. When Darwin spoke of the struggle for existence and survival of the fittest in nature, he was convinced that interspecific competition is a potent force in organic evolution.
56. Shallow South American lakes, visiting flamingoes and resident fishes compete for their common food, the zooplankton in the lake.
57. The Abingdon tortoise in Galapagos Islands became extinct within a decade after goats were introduced on the island.
58. Connell's elegant field experiments showed that on the rocky sea coasts of Scotland, the larger and competitively superior barnacle Balanus dominates the intertidal area, and excludes the smaller barnacle Chathamalus from that zone.
59. Gause's 'Competitive Exclusion Principle' states that two closely related species competing for the same resources cannot co-exist indefinitely and the competitively inferior one will be eliminated eventually.
60. One such mechanism is '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.
61. MacArthur showed that five closely related species of warblers living on the same tree were able to avoid competition and co-exist due to behavioural differences in their foraging activities.
62. Parasitism considering that the parasitic mode of life ensures free lodging and meals, it is not surprising that parasitism has evolved in so many taxonomic groups from plants to higher vertebrates.
63. Many parasites have evolved to be host-specific (they can parasitise only a single species of host) in such a way that both host and the parasite tend to co-evolve.
64. Parasites evolved special adaptations such as the loss of unnecessary sense organs, presence of adhesive organs or suckers to cling on to the host, loss of digestive system and high reproductive capacity.
65. The life cycles of parasites are often complex, involving one or two intermediate hosts or vectors to facilitate parasitisation of its primary host.
66. The human liver fluke (a trematode parasite) depends on two intermediate hosts (a snail and a fish) to complete its life cycle.
67. The malarial parasite needs a vector (mosquito) to spread to other hosts.
68. 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.
69. Cuscuta, a parasitic plant that is commonly found growing on hedge plants, has lost its chlorophyll and leaves in the course of evolution.



70. **endoparasites** are those that live inside the host body at different sites (liver, kidney, lungs, red blood cells, etc.).
71. **Brood parasitism** in birds is a fascinating example of parasitism in which the parasitic bird lays its eggs in the nest of its host and lets the host incubate them.
72. This is the interaction in which one species **benefits** and the other is neither **harmed** nor **benefited**.
73. An orchid growing as an epiphyte on a **mango** branch, and **barnacles** growing on the back of a whale benefit while neither the mango tree nor the whale derives any apparent benefit.
74. The cattle egret and grazing cattle in close association, a sight you are most likely to catch if you live in farmed rural areas, is a classic example of **commensalism**.
75. The Mediterranean orchid **Ophrys** employs 'sexual deceit' to get pollination done by a species of **bee**.
76. The male bee is attracted to what it perceives as a female, '**pseudocopulates**' with the flower, and during that process is dusted with pollen from the flower.

Single Correct Answer Type

1. If $b = 65$ and d is $= 45$, $N = 100$ than find out dN/dt
 - a) 2000
 - b) 1000
 - c) 200
 - d) 100
2. The relationship between the alga *Microcystis* and the surroundings fauna correspond to
 - a) Amensalism
 - b) Parasitism
 - c) Predation
 - d) Exploitation
3. Basic unit of ecological hierarchy is
 - a) Species
 - b) genus
 - c) Population
 - d) Individual organism
4. Population is the total number of
 - a) Interbreeding individuals of a species found in particular place
 - b) Interbreeding individuals of a species found in same geographical area
 - c) Interbreeding individuals of a species found in different geographical area
 - d) All of the above
5. Mass of living matter at a trophic level in an area at any time is called
 - a) Detritus
 - b) Humus
 - c) Standing state
 - d) Standing crop
6. Newly developed pathogens are more damaging to host because host are called
 - a) Distant pathogen
 - b) Chronic pathogen
 - c) Instant pathogen
 - d) Genetic improved pathogens
7. Ephemerals are xerophytes that are
 - a) Drought resisting
 - b) Drought enduring
 - c) Drought escaping
 - d) None of these
8. Major biomes of India includes
 - I. tropical rainforest
 - II. Alpine region
 - III. deciduous forest
 - IV. Desert
 - V. Himalayan region
 - VI. sea coast

Choose the correct combination for given question

 - a) I, III, IV and V
 - b) I, II, III and IV
 - c) II, III, IV and VI
 - d) I, III, IV and VI
9. The integral form of the exponential growth equation as $N_t = N_0 e^{rt}$
 - A. Population density after time t
 - B. Population density at time zero
 - C. Intrinsic rate of natural increase
 - D. The base of natural logarithms (2.71828)

Identify A, B, C and D from the given equation

 - a) A-r, B-e, C-No, D-NE
 - b) A- N_t , B-No, C-r, D-e
 - c) A-No, B-NE, C-r, D-e
 - d) A-No, B-NE, C-e, D-r
10. *Nosema notabilis* is an example for
 - a) Commensalism
 - b) Symbiosis
 - c) Ectoparasitism
 - d) Hyperparasitism
11. Ecologist say that niche is like a species ...A..., while habitat is like a ...B... there A and B indicate
 - a) A-education; B-occupation
 - b) A-appearance; B-physiology
 - c) A-occupation; B-address
 - d) A-physiology; B-anatomy

12. Temperature is very significant to the living beings because of

- a) Kinetics of locomotion depends on temperature
- b) Kinetics of enzymes depends on temperature
- c) High temperature facilitates digestion
- d) Low temperature facilitates digestion

13. Soil has five components. The proportions of different components are

	Mineral Matter	Organic Matter	Soil Moisture	Soil Atmosphere	Soil-Organism
a)	40%	10%	25%	25%	Variable
b)	40%	10%	25%	25%	10%
c)	40%	10%	35%	15%	10%
d)	30%	20%	25%	25%	10%

14. Many parasites have evolved to be ...A... in such a way that both host and the parasite tend to ...B... that is, if the host evolves special mechanisms for rejecting or resisting the parasite, the parasite has to evolve mechanisms to ...C... and neutralize them, in order to be successful with the same host species

Choose the correct option for A, B and C

- a) A-host-specific, B-evolve, C-counteract
- b) A-host-specific, B-coevolve, C-counteract
- c) A-source specific, B-coevolve, C-counteract
- d) A-source specific, B-evolve, C-counteract

15. Which of the following is true regarding exponential growth?

- a) No population can grow exponential for long
- b) Exponential growth slows down as the population nears its log phase
- c) Bacterial colonies have been observed to maintain exponential growth always
- d) Exponential growth is a commonly observed in large, slow-growing species such as humans and elephants

16. Any species growing ...A... growing under unlimited resource conditions can reach enormous population densities in a short time. Darwin showed how even ...B... growing animal like elephant could reach enormous numbers in absence of check and that characteristics of organism is called C

Choose the correct option for A, B or C respectively

- a) A-logistically, B-fast, C-carrying capacity
- b) A-logistically, B-slow, C-biotic potential
- c) A-exponential, B-slow, C-biotic potential
- d) A-exponential, B-fast, C-biotic potential

17. Pedology refers to study of

- a) Soil
- b) Water
- c) Population
- d) Fossils

18. Under a particular set of selection pressure, organisms evolve towards the most ...A... reproductive strategy. Some organisms breed only ...B... in lifetime while others breed ...C... in life time

Choose the correct option for A, B and C

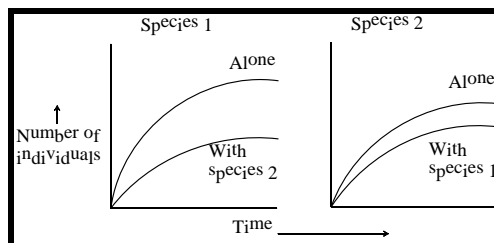
- a) A-efficient, B-once, C-many
- b) A-efficient, B-many, C-once
- c) A-deficient, B-many, C-once
- d) A-deficient, B-once, C-many

19. Halophytes are

- a) Fire-resistant
- b) Cold-resistant
- c) Salt-resistant
- d) Sand-loving

42. Age structure of a population influences population growth because
- Different age group have different reproductive capabilities
 - Different age group have same reproductive capabilities
 - More young individual indicate decreasing population
 - All of the above
43. Photosynthetic yield is maximum at the
- Equator region
 - Polar region
 - Both (a) and (b)
 - Arid region
44. Which of the following statements regarding species interdependence are true?
- An Association of two species where one is benefitted and other remains unaffected is called mutualism.
 - An interspecific association where both partners derive benefit from each other is called commensalism.
 - A direct food relation between two species of animals in which one animal kills and feeds on another is referred as predation.
 - A relationship between two species of organisms where both are partners are benefitted from each other is called symbiosis.
- I and II only
 - III and IV only
 - I and III only
 - II and III only
45. In the absence of an external source of water, Kangaroo rat in North American desert is capable of meeting all its water requirements through
- Internal fat oxidation
 - Taking liquid food
 - Reducing his activities
 - Hibernation
46. Which of the following characters explain the bell-shaped curve?
- The number of pre-reproductive individual equal to the number of reproductive individual
 - Past reproductive individual are comparatively few
 - Growth is zero
 - All of the above
47. Population density of a population in a given habitat during a given period fluctuates due to change in
- Natality and mortality
 - Immigration
 - Emigration
 - All of these
48. Which determines the flora and fauna of a place?
- Weather
 - Climate
 - Both (a) and (b)
 - Habitat
49. In aquatic environment the types of benthic animals are determined by
- Type of water
 - Type of sediment characteristics
 - Light availability
 - Nutrient availability
50. In commensalism
- Both partners are harmed
 - Weaker partner is benefitted
 - Both partners are benefitted
 - None of the partners is benefitted
51. Population size of Siberian cranes at Bharatpur wetlands in any year is
- 1000
 - <10
 - >100
 - = 1000
52. If non-limiting conditions are provided then what will happen?
- Natality increases and mortality decreases
 - mortality decreases
 - Natality increases
 - Mortality increases

64. Humus is present in
 a) Horizon-A
 b) Horizon-O
 c) Horizon-B
 d) Horizon-C
65. Species living in a restricted geographical area is
 a) Sympatric
 b) Allopatric
 c) Sibling
 d) keystone
66. Abiotic factors affects the
 I. Structure of organisms
 II. Physiology of organisms
 III. Behaviour of organisms
 a) I and II
 b) II and III
 c) I, II and III
 d) I and III
67. Zero growth of population is indicated by
 a) Less number of child birth
 b) Less number of reproductive females
 c) Reproductive individual are equal to pre-reproductive individuals
 d) Less number of male then females
68. Which one is the edaphic factor in biosphere?
 a) Light
 b) Temperature
 c) Water
 d) Soil
69. In laboratory experiments, two species of the protest *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 alone 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 affected less
 c) Both species are affected by interspecific competition but species 2 is affected less
 d) Both species are affected equally by interspecific competition
70. When the value of ' r ' is significantly low as compared to other. It is better known by
 a) Competition exclusion
 b) Resource partition
 c) Interference competition
 d) Competition release
71. Good soil is that which
 a) Holds whole of the water that enters into it
 b) Allows percolating the water slowly from it
 c) Allows water to pass very quickly from it
 d) Allows limited amount of water to retain into it
72. Population size is more technically called
 a) Population density
 b) Demography
 c) Population growth
 d) Population dynamics
73. Identify the basic levels of ecology
 I. Organisms
 II. Populations
 III. Communities
 IV. Biomes
 V. Human
 VI. Vertebrates
 Choose the correct option

84. I. Salmon II. Shark
III. Sting ray

Which of them is/are stenohaline and euryhaline?

	Stenohaline	Euryhaline		Stenohaline	Euryhaline
a)	I, III	II	b)	I, II	III
c)	II, III	I	d)	I	II, III

85. I. Species level II. Population level
III. Individual level IV. Community level

Out of the levels given at a which level selection operates

a)	I and II	b)	Only II
c)	III and IV	d)	Only IV

86. Why no predator become proficient in acquiring prey?

- a) Prey populations evolve antipredatory traits
- b) Prey populations reproduce fastly
- c) Predator populations reproduce fastly
- d) Predators are too large to be fast enough

87. The inherent maximum capacity of an organism to reproduce or increase in number is called as

- a) Biotic potential
- b) Ecosystem
- c) Population
- d) Ecology

88. The species of plants that play a vital role in controlling the relative abundance of other species in a community are called

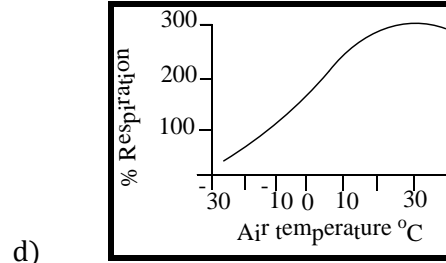
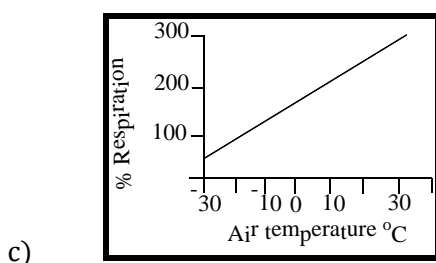
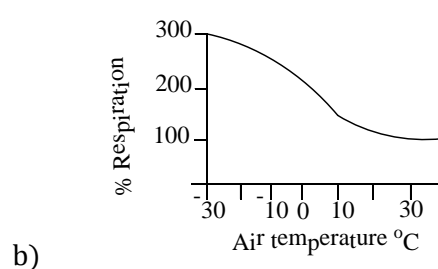
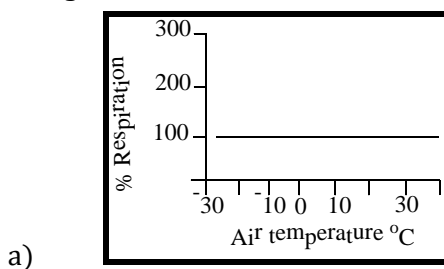
- a) Edge species
- b) Keystone species
- c) Pioneer species
- d) Seral species

89. In most animals, the metabolic reactions proceed in a ...A... temperature range (in humans, it is 37°C). But there are microbes (archaebacteria) that flourish in hot springs and deep sea hydrothermal vents where temperature far exceed ...B...

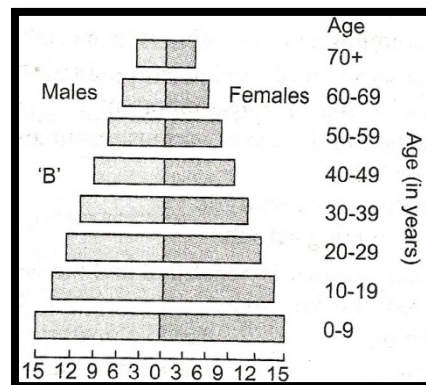
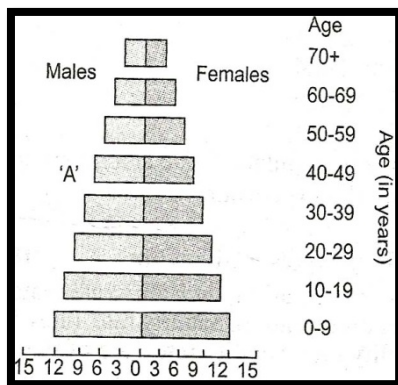
Choose the correct option for A and B

- a) A-narrow; B-100°C
- b) A-broad; B-100°C
- c) A-median; B-100°C
- d) A-broad; B-40°C

90. Which of the following graphs correctly depicts the rate of respiration of a non-hibernating mammal living in cold climate?



91. I. Basking by desert lizards in sun
 II. Hiding in burrow by some animals
 III. Thermal gaping
 Above are the examples of
- a) Cursorial adaptation b) Behavioural adaptation
 c) Fossorial adaptation d) Scansorial adaptation
92. The science dealing with soil is
- a) Edaphology b) Paedology
 c) Pedology d) All of these
93. 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) 'A' is more recent and shows slight reduction in the growth rate
 b) 'B' is earlier pyramid and shows stabilised growth rate
 c) 'B' is more recent showing that population is very young
 d) 'A' is the earlier pyramid and no change has occurred in the growth rate
94. "Two closely related species competing for same resources cannot co-exist indefinitely". This law is also called
- a) Gause's law b) Competitive exclusion principle
 c) Both (a) and (b) d) Competition release principle
95. Epiphyte is an example of
- a) Predation b) Competition
 c) Parasitism d) Commensalism
96. Plants of aquatic habitat is called
- a) Hydrophytes b) Halophytes
 c) Mesophytes d) Megaphytes
97. The formula of growth rate for population in a given time is
- a) $dt/DN = rN$ b) $dt/rN = dN$
 c) $rN/dN = dt$ d) $dN/dt = rN$
98. I. The organism which tolerate wide range of salinity called ...A...
 II. The organism which tolerate narrow range of salinity called ...B...
 Choose the correct option for A and B
- a) A-stenohaline; B-euryhaline b) A-euryhaline; B-stenohaline
 c) A-isohaline; B-euryhaline d) A-heterohaline; B-isohaline
99. Gause's law is true only when
- a) Resources are limited b) Resources are unlimited
 c) Predator are limited d) Prey are unlimited

108. Under normal condition ...A... andB... are the most important factors influencing populations density ...C... and ...D... assuming importance only under special condition
Choose the correct option for A, B and C
- A-mortality, B-natality, C-emigration, D-immigration
 - A-immigration, B-natality, C-emigration, D-mortality
 - A-emigration, B-natality, C-mortality, D-immigration
 - A-emigration, B-immigration, C-mortality, D-natality
109. Attribute of the organisms (morphological, physiological and behavioural) that enables organism to survive and reproduce in its habitat is called
- Phenotypic plasticity
 - Adaptations
 - Mimicry
 - Surviving abilities
110. The organism which are present in tropical regions called
- Mesotherms
 - Megatherms
 - Microthermas
 - Hekistotherms
111. The type of population, where pre-reproductive animals occur in large numbers, is
- Declining
 - Fluctuating
 - Stable
 - Growing
112. Which characteristics determine the percolation and water holding capacity of soils?
- Soil composition
 - Grain size
 - Aggregation
 - All of these
113. Which one is right for logistic model for population growth?
- Population growth rate increases as the size of population approaches the carrying capacity
 - All individual have same effect on population growth
 - There are unlimited natural resources
 - As population increases the competition goes on increasing
- Select the correct combination
- I and II
 - Only IV
 - IV and III
 - I and III
114. Which of the following supports a dense population of plankton and littoral vegetation?
- Oligotrophic
 - Eutrophic
 - Lithotrophic
 - Agroecotrophic
115. Parasite lives on the other parasite called
- Fittest parasite
 - Parasite on parasite
 - Hyperparasite
 - Hypoparasite
116. If the mean and the madian pertaining to a certain character of a population are of the same value, the following is most likely to occur
- A normal distribution
 - A bi-modal distribution
 - A T-shaped curve
 - A skewed curve
117. Two species occupying same or overlapping area are called as
- Sympatric
 - Allopatric
 - Parapatric
 - Ring species
118. UV radiation and IR radiation have the range of
- | | UV Radiation | IR Radiation | | UV Radiation | IR Radiation |
|----|------------------|--------------------|--|------------------|------------------|
| a) | More than 100 nm | Less than 400 nmb) | | Less than 400 nm | More than 700 nm |
| c) | Equal to 400 nm | Equal to 700 nm d) | | Less than 100 nm | More than 100 nm |



119. In previous question $b - d$ represented by r , then ' r ' may be called as
- a) Intrinsic rate of natural increase
 - b) Extrinsic rate of natural increase
 - c) Morphological rate of natural increase
 - d) Phenotypical rate of natural increase
120. Formation of major biomes such as desert, rainforest takes place by
- a) Rotation of our planet around the sun
 - b) Tilting of our planet to its axis
 - c) Both (a) and (b)
 - d) Seasonal periodicity

: ANSWER KEY :

1)	a	2)	a	3)	d	4)	a	5)	d	6)	c	7)	c	8)	d
9)	b	10)	d	11)	c	12)	b	13)	a	14)	b	15)	a	16)	d
17)	a	18)	a	19)	c	20)	b	21)	b	22)	d	23)	b	24)	b
25)	a	26)	a	27)	b	28)	b	29)	a	30)	a	31)	d	32)	a
33)	b	34)	c	35)	a	36)	c	37)	d	38)	d	39)	c	40)	b
41)	b	42)	a	43)	a	44)	b	45)	b	46)	d	47)	d	48)	b
49)	b	50)	b	51)	b	52)	a	53)	a	54)	a	55)	b	56)	a
57)	b	58)	b	59)	c	60)	b	61)	a	62)	d	63)	b	64)	a
65)	a	66)	c	67)	c	68)	d	69)	c	70)	c	71)	b	72)	a
73)	c	74)	b	75)	d	76)	d	77)	b	78)	d	79)	b	80)	b
81)	d	82)	b	83)	b	84)	c	85)	b	86)	a	87)	a	88)	b
89)	a	90)	d	91)	b	92)	d	93)	a	94)	c	95)	d	96)	a
97)	d	98)	b	99)	a	100)	d	101)	a	102)	b	103)	b	104)	c
105)	b	106)	b	107)	b	108)	a	109)	b	110)	b	111)	d	112)	d
113)	b	114)	b	115)	c	116)	a	117)	a	118)	b	119)	a	120)	c



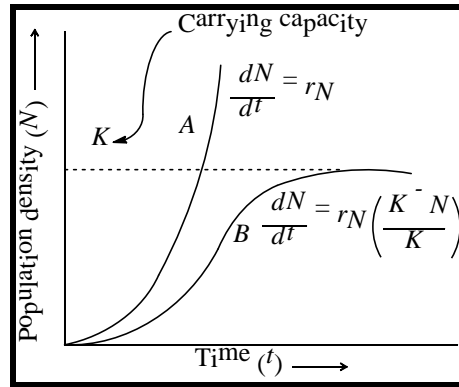
- 10 (d)
A hyperparasite is an organism, which parasitizes on another parasite. *Nosema notabilis* is a hyperparasite of *Sphaerospora polymorpha*, which in turn is a parasite of urinary bladder of toad fish.
- 11 (c)
A-Occupation; B-Address
- 12 (b)
Enzymes are very sensitive towards the temperature. A slight decrease or increase in temperature can cause denaturation or Inactivation of enzymes. That way temperature is very significant to living beings
- 13 (a)
Soil has five components
The proportions of different components are as follows
- | | |
|------------------------------|---------------------------|
| I. Mineral matter – 40% | II. Organic matter – 10% |
| III. Soil moisture – 5% | IV. Soil atmosphere – 25% |
| V. Soil organisms – Variable | |
- 14 (b)
A-Host specific, B-Coevolve, C-Counteract
- 15 (a)
No population can grow exponentially long because
- | | |
|--------------------------------|-------------------------|
| (i) limiting resources | (ii) carrying capacity |
| (iii) interspecies competition | (iv) natural resistance |
- 16 (d)
A-Exponential, B-Fast, C-Biotic potential
- 17 (a)
Pedology (GK. Pedon = soil; logos = study) is the study of soil in their natural environment. It deals with pedogenesis (formation of soil), soil morphology and soil classification.
- 18 (a)
A-Efficient, B-Once, C-Many
- 19 (c)
Warming divided plants, on the basis of soil in which they are found, into the following groups.
- | |
|---|
| (i) Halophytes plants growing in saline soil, i.e. these plants are salt resistant. |
| (ii) Psammophytes plants growing on sand, i.e., these are adapted to grow into sandy soil. Thus, these are also known as sand loving plants. |
| (iii) Oxalophytes plants growing in acidic soil. |
| (iv) Lithophytes plants growing on the surface of rocks. |
| (v) Chasmophytes plants growing in the crevices of rocks. |
- 20 (b)
The value of growth rate under unlimited favourable conditions is called **biotic potential** or reproductive potential. It is characteristic of a particular population age structure.
- 21 (b)
In **mutualism**, both the interacting species are benefitted.
- 22 (d)
Clines are formed by continuous gradation of form or gene differences in population of a species, correlated with its geographical or ecological distribution.

- 23 (b)
Under favourable conditions many zooplanktons in lakes and ponds are known to enter as diapause, i.e., a stage in suspended development. Infact diapause is stage in the development of certain animals, during which developmental growth is suspended during winter when days are short
- 24 (b)
Vital index represents the ratio between natality (birth rate) and mortality (death rate). It determines the normal rate of growth of population and can be calculated by the following formula:
$$\text{Vital index} = \frac{\text{Natality}}{\text{Mortality}} \times 100$$
- 25 (a)
Due to limited sources, increased competition and environmental resistance the population fluctuate when it reaches to carrying capacity
- 26 (a)
$$\text{Population density} = \frac{\text{Number of Population}}{\text{Area}}$$
$$= \frac{1000}{100} = 10$$

Population density = 10 individuals per unit square area
- 27 (b)
400-700 nm.
Light is the visible part of electromagnetic spectrum (390-700 nm). Solar radiations have a wavelength of 300-2600 nm. Photosynthetically Active Radiations (PAR) have a large of 400-700 nm
- 28 (b)
5th June-world environment day
22nd April-world earth day
- 29 (a)
Extinction is the result of competition of species.
- 30 (a)
A-Spores, B-Unfavourable, C-Seeds
- 31 (d)
Life history traits of organism have evolved to the constraints imposed by biotic and abiotic components of habitat in which they live
- 32 (a)
As we can see from the table that the birth rate and death rate of population country 'P' is almost same so there is very little change in the population of country. 'P' then others
- 33 (b)
Opuntia's leaves changes into spine to reduce the transpiration during course of evolution and the working of leaves takes over by stem. Opuntia's stem have green colour and perform photosynthesis
- 34 (c)
Root cap is not found in hydrophytes. In **hydrophytes**, the root is either absent or poorly developed. In floating aquatic plants, root pockets are found, e.g., Lemna, pistia, Eichhornia.
- 35 (a)
Proto-cooperation is the interaction between two living organisms of different species in which both are mutually benefited but they can live without each other.



- 36 (c)
Water holding capacity is the extent to which a soil can hold capillary water against gravity. It is defined as the amount of water retained by unit weight of dry soil, when immersed in water under standardised condition. Sandy soil has poorest water holding capacity.
- 37 (d)
Level of competition depend upon the many factors like
(i) Resources availability
(ii) Population density
(iii) Group interaction of organisms
- 38 (d)
Plant Adaptation to Water and Heat (xerophytes) They are plants of dry habitats where the environment favours higher rate of transpiration than the absorption. Xerophytes plants normally have thick cuticle on their leaf surface, stomata arranged in deep pits, stomata of xerophyte plant remain closed during day to reduce the high transpiration
Xerophytes are four types
(i) **Ephemerals** (Drought escapers) The plant live for a brief period during rain. The rest of year is passed in the form of seed
e. g., Euphorbia prostrate, Boerhaavia
(ii) **Annuals or Drought Evaders** They live even after the few weeks of rain. Their, size are small, leaves have thick waxy, hairy coating with or without prickles, e. g., Echinops, Solanum
(iii) **Succulents or Drought Resistant** The plants have fleshy organs where water and mucilage are stored. e. g., Opuntia, Aloe, Agave
(iv) **Non-succulents or Drought Endurers** They are true xerophytes which actually tolerate drought conditions. They have smaller shoot system. The root system is very extensive. Many tropical plants of hot and arid regions perform C₄-photosynthesis. They uses less water even at high temperature
- 39 (c)
Physiological adaptation.
Nausea, fatigue, heart palpitations is due to unavailability of proper oxygen in the body. At high mountain the atmospheric pressure is low. So, O₂ is not easily available for Respiration. So for improve efficiency of respiration is increased by increasing RBC increasing the binding efficiency of haemoglobin
- 40 (b)
Biotic potential is a rate at which a population of a given species will increase when no limits are placed on its rate of growth.
- 41 (b)
A – N, B– r, C– K
Logistic Growth Model No population can continue to grow exponentially, as the resource availability become limiting at certain point of time. Logistic growth model have fixed carrying capacity
It is described by the equation $\frac{dN}{dt} = rN \left(\frac{K-N}{K} \right)$ Rate of change of population density
N = Population density at time
N = Population density
r = Intrinsic rate of natural increase
K = Carrying capacity



Population growth curve A when resources are not limiting. Plot is exponential or geometrical curve B. When resources are limiting the growth, plot is logistic

'K' is carrying capacity

42 (a)

Different age group have different reproductive capabilities due to that population growth influences. For example when pre-reproductive age group is more than the reproductive and post-reproductive. Then this type of population is expanding population

43 (a)

In tropical areas (equator) there are more sun light than the other areas. So, tropical areas have more photosynthetic yield than other areas

44 (b)

Predation is a direct food relation between two species of animals, in which one animal (the predator) captures and feeds on another (the prey).

In **symbiosis**, two organisms live together in close physical association from which one or both derive benefit.

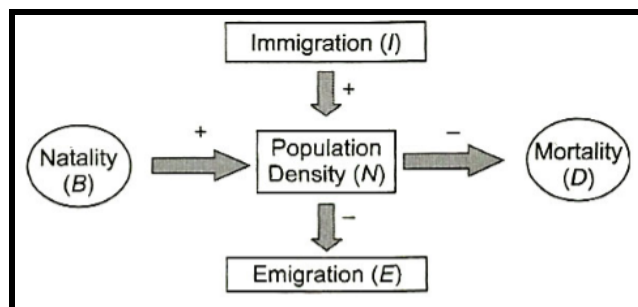
45 (b)

Many adaptation have evolved over a long evolutionary time in Kangaroo rat. In the absence of an external source of water, the kangaroo rat in North America deserts capable of meeting all its water requirements through internal fat oxidation (in which water is by product). It also has the ability to concentrate its urine, so that minimal volume of water is used to remove excretory the products

46 (d)

When the number of pre-reproductive individual equal to no. of reproductive non-individual is obtained a bell-shaped curve

47 (d)



(-) Sign indicates factors decreasing population density

(+) Sign indicates factors increasing population density



48 (b)
Climate.

Differences between weather and climate

Weather	Climate
It is a short term property of the atmosphere.	It is the long term property of the atmosphere.
Weather changes from place to place.	It is average weather.
Weather changes have little impact on flora and fauna of a place.	Climate is same over larger area.
Changes in weather occur from time to time	Climate determines the flora and fauna of a place.
	Climate remains the same over a long period of time

49 (b)
Benthic animals are animals which lives at the bottom of water. Their diversity and distribution determined by type of sediment characteristics like rocky or soil surface

50 (b)
Commensalism is an association in which two or more populations live together without entering into any kind of physiological exchange. Here only one species is benefitted.

51 (b)
Population size of Siberian cranes at Bharatpur wetlands in any year is less than 10.
Population size The size of a population depends upon several factors like mortality, natality, etc. The size in nature could be as low as less than 10 (Siberian cranes at Bharatpur wetlands in any year) or go in million (Chlamydomonas in a pond).
Population size, more technically called population density (designated as N) need not necessarily be measured in numbers only. Although the total number is the most appropriate measure of population density. But in some cases in is different to determine

For example

In a forest area suppose there are 200 Parthenium plants but only a single banyan tree will huge canopy

The following inference could be made

- (i) Population density of banyan is low
- (ii) Population cover area of banyan to high

In this example percentage of cover of biomass is more meaningful than population size

52 (a)
Due to non-limiting condition, natality (birth rate) will increase and mortality (death rate) will decrease, that will cause population explosion.

53 (a)
Bioma is a large regional unit delimited by a specific climatic zone having a particular major vegetation zone associated with fauna, e. g., ocean, tropical rainforest

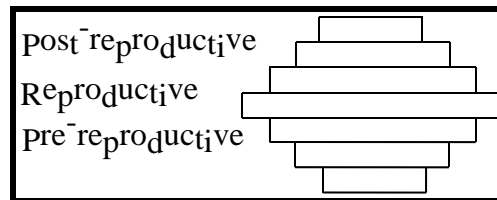
54 (a)
Gloger's Rule In warm-blooded animals, including, humans, pigmentation is little in colder areas, yellow brown to red in arid climates and black in humid hot areas

55 (b)
A population with large number of post-reproductive or older individuals and lesser number of pre-reproductive individuals will show a negative growth rate or decline growth.

Age pyramid Graphic representation of different age groups found in a population with pre-reproductive group at the base. Reproductive ones in the middle and post-reproductive group at the top is called age pyramid.

Age pyramid have three kinds

- (i) **Triangular Age Pyramid** The number of pre-reproductive is very large. Number of reproductive individual is moderate and post-reproductive are fewer. Population size is growing
- (ii) **Bell-shaped Age Pyramid** The number of prereproductive and reproductive individuals is almost equal. Post-reproductive individuals are comparatively fewer. Population size is stable
- (iii) **Urn-shaped Age Pyramid** Proportion of reproductive age group is higher than the individuals in pre-reproductive age group. Number of post-reproductive individuals is also sizable. It is declining population with negative growth



56 (a)

The zone extends between 45° to 66° in northern and 45° to 66° in southern hemisphere is called **temperate zone**.

57 (b)

In India, population is heavily weighed towards the younger age groups due to short life span and high birth rate.

58 (b)

$$dN/dt = (b - d) \times N.$$

Exponential Growth Model When the resources availability is unlimited in the habitat, the population grows in an exponential or geometric fashion. As resources are unlimited than there is no inhibition from crowding.

The equation is; $dN/dt = (b - d) \times N$ [b = Birth rate, d = Death rate

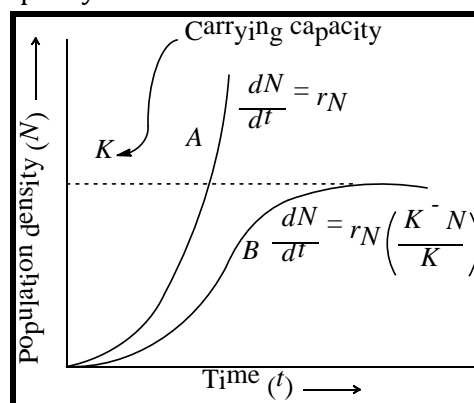
N = Population density, $\frac{dn}{dt}$ = Rate of change of population

Let (b-d) = r, then the equation is, $dN/dt = Rn$

r = Intrinsic rate of natural increase

When a population shows exponential growth, the curve plotted with N in relation to time, assume J shape

In this there is no fix carrying capacity



59 (c)

Logistic Growth Model No population can continue to grow exponentially, as the resource availability become limiting at certain point of time. Logistic growth model have fixed carrying capacity

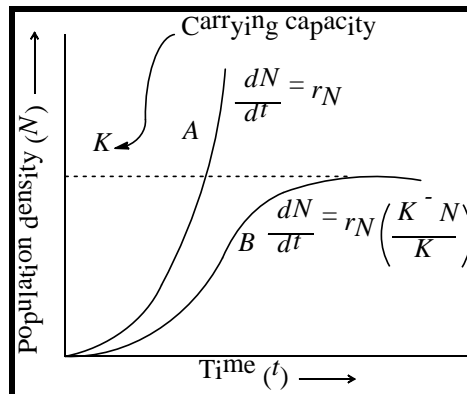
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Population growth curve A when resources are not limiting. Plot is exponential or geometrical curve B. When resources are limiting the growth, plot is logistic

'K' is carrying capacity

60 (b)

It is generally believed that competition occurs when closely related species compete for same resources that are limiting. But this is not true unrelated species also compete for same resources. This is called interspecific competition which proves to be the potent force in organic evolution

61 (a)

Zero growth rate means natality (i.e., birth rate) balances the mortality (i.e., death rate)

62 (d)

Black soil is dark black or dark brown in colour. It is formed from basaltic rock under semi-arid condition. Black soil is deficient in nitrogen and phosphorus and rich in potash and lime and not in calcium carbonate.

63 (b)

Deep (>500 m) in the oceans the environment is perpetually dark and its inhabitants are not aware of the existence of celestial source of light

64 (a)

In soil profile, **A-horizon** is present under the litter zone and is called as top-soil. It is the the zone of eluviations that contains a relatively high content of **organic matter** but mixed with mineral water. It is further divided into three sub-zones :

(i) **A₁ region** : It is dark and rich in organic matter. Finely divided organic matter here, becomes mixed with the mineral matter and is known as **humus**. It is dark brown or black coloured.

(ii) **A₂-region** : It contains less humus and is called as the zone of maximum leaching.

(iii) **A₃-region** : It is transitional to B-zone but is more like the A-zone than B.

Sometimes, it is totally absent.

65 (a)

The species living in a restricted or overlapping area of geographical distribution, are called **sympatric species**.

- 66 (c)
All of the above.
The most important elements that lead to so much variation are temperature, water, light, soil. Physio-chemical components alone do not characterize the habitat of an organism completely. It includes biotic factors also. So for characterization of habitat both abiotic and biotic components are needed
- 67 (c)
Zero growth of population indicated when various age groups are evenly balanced.
Age pyramid Graphic representation of different age groups found in a population with pre-reproductive group at the base. Reproductive ones in the middle and post-reproductive group at the top is called age pyramid.
Age pyramid have three kinds
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- 68 (d)
An abiotic factor relating to the physical or chemical composition of the soil found in a particular area is called edaphic factor , while temperature , light and water precipitation (rainfall) are climatic factors.
- 69 (c)
As we can see from graph 1 that there is more gap between lines of species 1 and 2 than the graph 2. So it is clearly interference out that both species are affected by interspecific competition but species two is less affected
- 70 (c)
In the interference competition two species interfere in each other's natural resources for living hood. Naturally they effect on each other's intrinsic growth rate (r). The volume of ' r ' is low significantly in interference competition
- 71 (b)
The good soil is that which allows percolating the water slowly from it, e.g., alluvial soil (i.e., soil carried by water).
- 72 (a)
Population size The size of a population depends upon several factors like mortality, natality, etc. The size in nature could be as low as less than 10 (Siberian cranes at Bharatpur wetlands in any year) or go in million (Chlamydomonas in a pond).
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 - Population cover area of banyan to high
- In this example percentage of cover of biomass is more meaningful than population size



- 73 (c)
Organisms, populations, communities, biomes.
Ecology is basically concerned with four levels of biological organisation. They are
(i) organisms (ii) populations
(iii) communities (iv) biomes
- 74 (b)
A-Maintaining; B-Reducing
- 75 (d)
A-Population density; B-Pyramid
- 76 (d)
Mortality is the death rate per thousand individuals per year. Mortality rate decreases population size and population density.
- 77 (b)
Since, same animals of a niche have the similar requirements of food, light, water, space, shelter and mate, etc, so intraspecific competition (between animals of same species) is more acute than interspecific, when different animals have different requirements and adaptations (i.e., different niche). In same niche, there will always a competition but it is more severe, when similar animal species are present and less, when different animals are there with a few similar needs.
- 78 (d)
Ecology is the study of reciprocal relationship between organisms and their environment.
- 79 (b)
Stenothermal organisms are those organism, which can't tolerate wide range of temperature. They live within narrow range of temperature because of their requirement of nearly constant temperature throughout the year. e. g., amphibians, reptiles
- 80 (b)
Diapause occurs during the unfavourable conditions. Mostly it takes place in winter when temperature is too low to survive
- 81 (d)
A wide variety of chemical substances that we extract from plants on a commercial scale (nicotine, caffeine, quinine, strychnine, opium etc); are produced by them actually as defences against grazers and browsers
- 82 (b)
In Orchids (Ophrys), there is strange relationship with pollinator insects. The Mediterranean Orchid (Ophrys) employs sexual deceit to get pollination done by a species of bee. One petal of its flower bears an uncanny resemblance to the female of the bee in size, colour and markings. The male bee is attracted to what it perceives as a female. Pseudocopulates with the flower and in that process pollinates the flower
- 83 (b)
An age pyramid is a graphic representation of proportion of various age groups of a population with pre-reproductive at the base, reproductive in the middle and post reproductive at the top. For human population, the age pyramids show age distribution of males and females in a combined diagram. The shape of the age pyramids reflects the growth status of the population. In a declining population the shape of pyramid is urn-shaped.

- 84 (c)
Stenohaline (shark and string rays) and euryhaline (salmon).
Some organisms are tolerant to wide range of salinities called euryhaline, e. g., salmon fish but others are restricted to narrow range called stenohaline like shark and string rays. Many freshwater animals cannot live for long in sea water and vice-versa because of the osmotic problems they would face
- 85 (b)
Land of selection operates on the population level. **Population** It is a grouping of similar individuals in a particular geographical area or space. The different populations of the same organism present in particular geographical areas are called local population/demes. Selection operates only at the population level. A local population adapted genetically to its particular environment is called ecotype
- 86 (a)
No predator become proficient in acquiring prey because pray population also evolve anti predatory traits to protect themself
- 87 (a)
Biotic potential is the inherent capability of an organism to reproduce and increase in number under ideal conditions.
- 88 (b)
Within biological communities, some species may be important in determining the ability of large number of other species to persist in the community. These crucial species have been termed keystone species. These have often considerably low abundance and biomass as compared to dominant species but their removal or decrease in number causes serious disruption in the functions of community, e.g., top predators, grey wolves in grasslands, etc.
- 89 (a)
A-Narrow; B-100°C
- 90 (d)
Non-hibernating mammal living in cold climatic would have the high respiration rate. As the temperature goes on increasing the respiration also goes on increasing but up to the certain limit. Beyond that limit the respiration goes on decreasing
- 91 (b)
Some organisms show behavioural adaptation to cope with variation in environment. Desert lizards lack the physiological ability to deal with high temperature. They keep their body temperature fairly constant by behavioural means. They enjoy in sun and absorb heat when their body temperature is low. When their body temperature starts increasing it moves into shades
- 92 (d)
The science dealing with study of soil is called edaphology or Paedology or Pedology
- 93 (a)
Interpretation (a) is correct.
- 94 (c)
Gause's hypothesis (Principle of Competitive Exclusion) Gause (1934) found that out of two species of Paramecium grown together one is eliminated. This phenomenon is called Gause's hypothesis or principle of competitive exclusion. This principle operates when the resources are limited and two species competetes for same resources
- 95 (d)
Epiphytes (Epic-upper; phytes – plants) is an example of commensalism in which plant takes the shelter on the upper branches of their host for taking sunlight

96 (a)
Plants of aquatic habitat is called the hydrophytes. Hydrophytes possess aerenchyma or air storing parenchyma to support themselves in water

97 (d)
The growth rate for population in a given time is calculated by

$$\frac{dN}{dt} = rN$$

98 (b)
Some organisms are tolerant to wide range of salinities called euryhaline, e. g., salmon fish but others are restricted to narrow range called stenohaline like shark and sting rays. Many freshwater animals cannot live for long in sea water and vice-versa because of the osmotic problems they would face

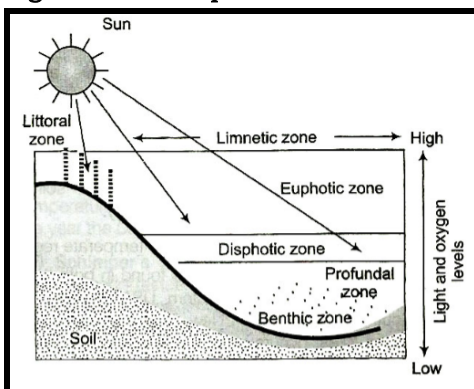
99 (a)
Resources are limited.
Gause's hypothesis (Principle of Competitive Exclusion) Gause (1934) found that out of two species of Paramecium grown together one is eliminated. This phenomenon is called Gause's hypothesis or principle of competitive exclusion. This principle operates when the resources are limited and two species compete for same resources

100 (d)
Community in an assemblage of population of different species of plants, animals, bacteria, fungi, etc. which live in a particular area and interact with one another through competition, predation, mutualism, etc.

101 (a)
Biotic potential is natality under optimum condition. The actual birth rate under existing condition is called realized natality.

102 (b)
Population keeps on changing due to various factors like immigration, emigration, natality and mortality. So, it is dynamic rather than stable phenomena

103 (b)
Light Zones in Aquatic Habitats There is a light zonation in deep lakes and oceans



- (i) **Littoral Zone** It is shallow coastal region. Light is able to pass through shallow water and reach the bottom. Therefore, producers occur throughout from surface to bottom
- (ii) **Limnetic Zone** It is open water zone where water is very deep. Amount of oxygen and light decreases with depth.

Limnetic zone has following three parts

Photic Zone It is upper part of limnetic zone to which light can penetrate. Depth is up to 200 m. The upper part of photic zone, called **euphotic zone**, receives light more than the compensation point. Its

depth is 20-80 m. The lower part of the photic zone, called **disphotic zone** (twilight zone), receives light at or below the compensation point.

Blue light being made of short wave radiations can reach the deepest. Red light has poor penetrability. In sea the green algae remain near the surface, brown algae in intermediate depths, while red algae flourish the deepest in the photic zone

Aphotic/Profundal Zone It is zone of deep water below the photic zone and above the bottom to which light does not penetrate. The zone is, therefore, in perpetual darkness. Producer to not occur in this part. Instead only consumers are found

Benthic Zone It is the bottom zone. In deep lakes and seas, the bottom is also in perpetual darkness but in shallow waters, light does penetrate

104 (c)

Probiosis It is opposite to the antibiotic. Probiosis is the phenomena in which organism secretes chemicals which are useful to the growth of other organism. Generally, it is found in intestinal flora

105 (b)

A-Physiological; B-High, C-Behavioural

106 (b)

5th June-world environment day

22nd April-world earth day

107 (b)

Ecology at the organismic level is essentially called physiological ecology which tries to understand how different organisms are adapted to their environments in terms of not only survival but also reproduction

108 (a)

A-Mortality, B-Natality, C-Emigration, D-Immigration

109 (b)

Adaptation develop due to natural selection of suitable variations appearing in living beings through mutation and recombination. It enables organism to survive and reproduce in its habitat

110 (b)

Organism, which present in tropical regions are called megatherms.

Temperature gradient over the earth's surface is 6.4-6.5°C per 1000m altitude or 10° latitude. Therefore, there is lowering of mean temperature from equator to poles. Tropical, sub-tropical, temperate and arctic organisms living in these zones are respectively called Megatherms, mesotherms, microtherms and hekistotherms

Zone	Latitude	Mean Annual Temperature	Winter	Vegetation
Tropical	0° – 20°	Above-24°C	Nil	Tropical forests
Sub-tropical	20° – 40°	17° – 24°C	Mild winter	Sub-tropical deciduous forest
Temperature	40° – 60°	7° – 17°C	Winter with occasional show	Mixed coniferous forest
Arctic and Antarctic	60 – 80°	Below-7°C	Severe prolonged winter with abundant show	Arctic forest

111 (d)

In a growing population, the pre-reproductive, i.e., immature animals occur in large number.

112 (d)

Various characteristics of the soil such as soil composition, grain size and aggregation determine the percolation and water holding capacity of the soil. These characteristics along with parameters such as pH, mineral composition and topography determine the large extent vegetation in any area

113 (b)

Logistic model shows that

As population increases the competition goes on increasing.

Logistic Growth Model No population can continue to grow exponentially, as the resource availability become limiting at certain point of time. Logistic growth model have fixed carrying capacity

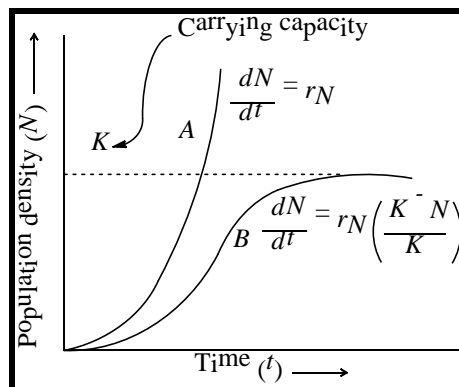
It is described by the equation $\frac{dN}{dt} = rN \left(\frac{K-N}{K} \right)$ Rate of change of population density

N = Population density at time

N = Population density

r = Intrinsic rate of natural increase

K = Carrying capacity

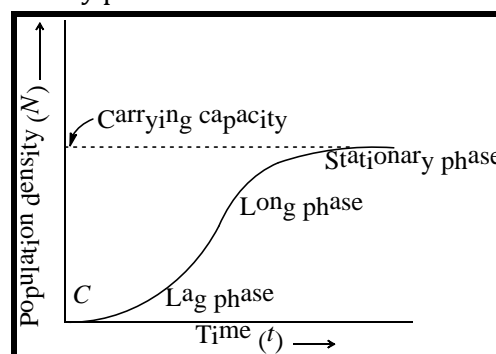


Population growth curve A when resources are not limiting. Plot is exponential or geometrical curve B. When resources are limiting the growth, plot is logistic

'K' is carrying capacity

A population growing in a habitat with limited resources shows three phases.

- (i) **Lag phase** It is the initial phase in which a population adapt themselves according to the environment and starts to increase their number
- (ii) **Log phase** It is the second phase in which a population use its resources maximally and increases their number exponentially. Number of birth \gg Number of death
- (iii) **Stationary phase** It is the 3rd phase in which the population reached the carrying capacity level and population get stationary position. No of birth = No of death



114 (b)

Eutrophication means nutrient enrichment. The main factor that causes eutrophication is the release of large amount of phosphate into water body.

- 115 (c)
Hyperparasite It is the parasite which lives on another parasite, e. g., some bacteriophage (bacterial, viruses), *Bacterium Pasteurella pestis* in *Xenopsylla chaeopsis* (rat flea) which is hyperparasite on rat
- 116 (a)
For a normal distribution, the mean, median and mode are actually equivalent.
- 117 (a)
Population of two or more species whose geographical ranges or distribution coincide or overlapped are known as **sympatric species**.
- 118 (b)
Less than 400 nm, more than 700 nm.
Radiation below the visible light (less than 400 nm) are ultraviolet (UV) radiations, while those above (more than 700 nm) the visible light are infra-red or heat waves. Amount of light and its intensity vary with latitude and season. Light intensity, light duration and light quality influence a number of life processes of organisms
- 119 (a)
'r' is the intrinsic rate of natural increase and is very important parameter chosen for assessing impacts of any biotic or abiotic factor on population growth
- 120 (c)
Rotation of our planet around sun and tilt of its axis cause annual variations in the intensity and duration of temperature, which leads to the formation of major biomes

**Assertion - Reasoning Type**

This section contain(s) 0 questions numbered 1 to 0. Each question contains STATEMENT 1(Assertion) and STATEMENT 2(Reason). Each question has the 4 choices (a), (b), (c) and (d) out of which **ONLY ONE** is correct.

- a) Statement 1 is True, Statement 2 is True; Statement 2 is correct explanation for Statement 1
b) Statement 1 is True, Statement 2 is True; Statement 2 is **not** correct explanation for Statement 1
c) Statement 1 is True, Statement 2 is False
d) Statement 1 is False, Statement 2 is True
- 1 **Statement 1:** Desert can be cold , e. g., Tibet, Gobi
 Statement 2: Desert can be hot, e. g., Thar, Sahara
- 2 **Statement 1:** Daphnia populations in a water body, at different seasons of an year showed marked variations in their body morphology.
 Statement 2: Cyclomorphosis in some planktonic organisms is influenced by the variations in temperatures prevailing in their water bodies at different seasons.
- 3 **Statement 1:** Predation is an interspecific interaction with a feeding strategy.
 Statement 2: Predator and their prey maintain fairly stable population through time and rarely one population become abundant or scarce
- 4 **Statement 1:** Species are groups of potentially interbreeding natural populations that are isolated from other such groups.
 Statement 2: Reproductive isolation brings about distinctive morphological characters.



: ANSWER KEY :

1)	d	2)	a	3)	b	4)	b									
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: HINTS AND SOLUTIONS :

- 1 **(d)**
Desert can be cold (e. g., Tibet, Gobi) and hot (e. g., Thar, Sahara). In true desert rainfall is less than 12 cm/yr while in extreme desert is less than 7cm/yr
- 2 **(a)**
Cyclomorphosis in some planktonic organisms is influenced by the variations in temperature prevailing in their water bodies at different seasons, e. g., Daphnia.
- 3 **(b)**
Predation is an interspecific interaction with a feeding strategy, i.e., one species (prey) is eaten up by another (predator). The number of predator usually depends upon the population of prey, but the latter is also controlled by predators. Thus, predatory and their prey maintain fairly stable population through time and rarely one population becomes abundant or scarce.
- 4 **(b)**
A species is a group of individuals, which resemble with each other in morphological, physiological, biochemical and behavioural characters. These individuals are capable of breeding, feeding in between themselves under natural conditions but are incapable of breeding with members of other species. Reproductive isolation is mainly responsible for the formation of new species.

Matrix-Match Type

This section contain(s) 0 question(s). Each question contains Statements given in 2 columns which have to be matched. Statements (A, B, C, D) in **columns I** have to be matched with Statements (p, q, r, s) in **columns II**.

1. Match the column I with column II and choose the correct option

Column-I		Column- II	
(A)	Mutualism	(1)	Tiger and deer
(B)	Commensalism	(2)	Cuscutta on circus
(C)	Parasitism	(3)	Sucker fish and shark
(D)	predation	(4)	Hermit Crab and sea anemone

CODES :

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

2. Column I represents the size of the soil particles and column II represents type of soil components. Which of the following is correct match for the column I and II?

Column-I		Column- II	
(A)	0.2 to 2.00 mm	(1)	Silt
(B)	Less than 0.002 mm	(2)	Clay
(C)	0.02 to 0.2 mm	(3)	Coarse sand particle
(D)	0.002 to 0.02 mm	(4)	Fine sand particle

CODES :

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

3. Match the following columns

Column-I		Column- II	
(A)	O-horizon	(1)	Surface layer of organism matter
(B)	A-horizon	(2)	Upper most soil called top soil
(C)	B-horizon	(3)	Sub-soil
(D)	C-horizon	(4)	Irregular rock fragments

CODES :

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

4. Match the following columns

Column-I

- (A) Mesotherms
(B) Microtherms
(C) Hekistotherms

CODES :

	A	B	C
a)	1	2	3
b)	1	3	2
c)	3	2	1
d)	3	1	2

Column- II

- (1) Arctic region
(2) Temperate region
(3) Sub-tropical region

5. Match the following columns

Column-I

- (A) Hydrophytes
(B) Mesophytes
(C) Xerophytes

CODES :

	A	B	C
a)	2	3	1
b)	1	2	3
c)	3	2	1
d)	2	1	3

Column- II

- (1) Dry habitat
(2) Wet habitat
(3) Moist habitat

6. Match the following columns

Column-I

- (A) Bergmann's rule
(B) Allen's rule
(C) Ransch's rule
(D) Jordan's rule

CODES :

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

Column- II

- (1) Vertebrae of fish
(2) Narrow wings of bird
(3) Extremities of mammals
(4) Size of bird mammal

7. Match the following columns

Column-I

- (A) Rafflesia
(B) Hyperparasite
(C) Lice
(D) Taenia

CODES :

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

Column- II

- (1) Endoparasite
(2) Ectoparasite
(3) Rat flea
(4) Phytoparasite

8. Match the following columns

- Column-I**
- (A) Diurnal
(B) Nocturnal
(C) Arboreal
(D) Vespersal

- Column- II**
- (1) Active during dusk
(2) Active at dawn
(3) Active during night
(4) Active during day time

CODES :

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

9. Match the following columns and choose the correct combination from the given option.

- Column-I**
- (A) Mutualism
(B) Commensalism
(C) Parasitism
(D) Competition
(E) predation

- Column- II**
- (1) Ticks on dogs
(2) Balanus and Chathamalus
(3) Sparrow and any seed
(4) Epiphyte on a mango branch
(5) Orchid, Ophrys and bee

CODES :

	A	B	C	D	E
a)	1	5	4	3	2
b)	2	1	5	4	2
c)	3	2	1	5	2
d)	4	3	2	1	2
e)	5	4	1	2	2

10. Match the following columns

- Column-I**
- (A) Ectoparasite
(B) Endoparasite
(C) Brood parasite

- Column- II**
- (1) Cuckoo
(2) Lice
(3) Cuscuta
(4) Ascaris
(5) Plasmodium vivax

CODES :

	A	B	C
a)	1	1	2,3
b)	1,4	2,3	1
c)	1,2	3,4	5
d)	2,3	4,5	1

11. Match the following columns

- Column-I**
- (A) Phototropism
(B) Photonasty
(C) Nyctinasty

- Column- II**
- (1) Opening or closing of flower due to light
(2) Movement of plant shoot toward light source
(3) Folding of leaves in response to darkness

CODES :

	A	B	C
a)	1	2	3
b)	1	3	2
c)	3	2	1
d)	2	1	3

12. Match the following columns

	Column-I
(A)	Pink cotton bollworm
(B)	Zooplankton
(C)	Snail
(D)	Polar bears

	Column- II
(1)	Diapause
(2)	Hibernation
(3)	Aestivation
(4)	Diapause

CODES :

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

13. Match the following columns

	Column-I
(A)	Hibernation
(B)	Aestivation
(C)	Cryptic appearance
(D)	Mimicry

	Column- II
(1)	Monarch butterfly
(2)	Leaf like grasshopper
(3)	Northern ground squirrel
(4)	Ground squirrel

CODES :

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

14. Match the following columns

	Column-I
(A)	Hygrophytes
(B)	Mesophytes
(C)	Xerophytes

	Column- II
(1)	Problems of water loss
(2)	Excess water in guttation
(3)	Luxuriant vegetative growth

CODES :

	A	B	C
a)	2	3	1
b)	2	1	3
c)	1	2	3
d)	1	3	2



15. Match the following column

Column-I

- (A) Mortality
(B) Immigration
(C) Emigration

Column- II

- (1) Individuals of same species going out from population
(2) Individuals of same species coming in population
(3) Numbers of deaths in population during given period
(4) Numbers of birth in population during given period

CODES :

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

16. Different types of interactions and the nature of interactions between species 'A' and 'B' are given in column I and II respectively. Choose the correct answer key where they are matched

Column-I

- (A) Mutualism
(B) Competition
(C) Parasitism
(D) Predation
(E) Commensalism

Column- II

- (1) Beneficial to 'A' and no effect on 'B'
(2) Beneficial to both 'A' and 'B'
(3) Beneficial to 'A' and inhibitory for 'B'
(4) Beneficial to 'A' and harmful to 'B'
(5) Harmful to both 'A' and 'B'

CODES :

	A	B	C	D	E
a)	5	4	1	2	3
b)	1	3	2	5	3
c)	2	5	4	3	3
d)	3	1	2	4	3
e)	4	2	5	1	3

17. Match the following columns

Column-I

- (A) Sandy soil
(B) Loam soil
(C) Clay soil

Column- II

- (1) 50%
(2) 40%
(3) 30%

CODES :

	A	B	C
a)	1	2	3
b)	1	3	2
c)	3	2	1
d)	3	1	2

18. Match the following columns

Column-I		Column- II	
(A) Tropical rainforest		(1) 200-300 cm	
(B) Tropical deciduous forest		(2) 100-250 cm	
(C) Temperate broad leaved forest		(3) 90-100 cm	
(D) Temperate needle forest		(4) 50-170 cm	

CODES :

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

19. Match the following columns

Column-I		Column- II	
(A) Logistic growth		(1) Sigmoid growth	
(B) Exponential growth		(2) Verhulst-pearl logistic growth	
		(3) Geometric growth	
		(4) J-shaped growth	

CODES :

	A	B
a)	1, 2	3, 4
b)	3, 4	1, 2
c)	1, 3, 4	2
d)	1	2, 3, 4

20. Match the following columns

Column-I		Column- II	
(A) Epiphytes		(1) Cattle egret	
(B) Grazing cattle		(2) Orchid on mango tree	
(C) Sea anemone		(3) Clown fish	

CODES :

	A	B	C
a)	1	2	3
b)	1	3	2
c)	2	1	3
d)	2	3	1



: ANSWER KEY :

1)	b	2)	c	3)	c	4)	c	5)	a	6)	c	7)	a	8)	a
9)	c	10)	d	11)	d	12)	a	13)	a	14)	a	15)	c	16)	c
17)	c	18)	c	19)	a	20)	c								

: HINTS AND SOLUTIONS :

1 (b)

Column I	Column II
(A) Mutualism	1. Hermit Crab and sea anemone
(B) Commensalism	2. Sucker fish and shark
(C) Parasitism	3. Cuscutta on circus
(D) Predation	4. Tiger and deer

2 (c)

Column I	Column II
(A) 0.2 to 2.00 mm	1. Coarse sand particle
(B) Less than 0.002 mm	2. Clay
(C) 0.02 to 0.2 mm	3. Fine sand particle
(D) 0.002 to 0.02 mm	4. Silt

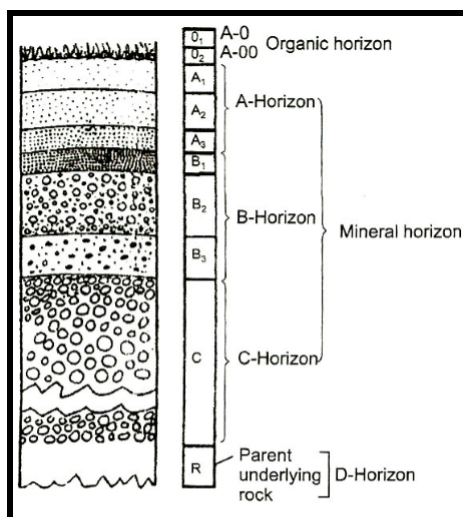
3 (c)

The appearance of different layers superposed one above the other in a vertical section of the soil from surface downward to parent rock is called soil profile.

Soil Horizons Soil layers running roughly parallel to the surface, which have distinct feature from other layer

A soil contains maximum three horizon, i.e., A, B and C

The surface litter layer is called O-horizon



Soil profile A-0 freshly fallen litter (partly decomposed)

A-00 organic matter (fermentation level and humus level)

A₁-organic debris + mineral. A₂-light colour due to leaching

A₃-may be present or absent

B-Horizon-iron and aluminium compounds. B₁-transitional layer. B₂-dark coloured, maximum amount of leached material. B₃-large chunk of parent rock material + leached material

C-thick, large masses of weathered mineral material

D-Unweathered parent rock material

4 (c)

Zone	Latitude	Mean Annual Temperature	Winter	Vegetation
Tropical	0° – 20°	Above-24°C	Nil	Tropical forests
Sub-tropical	20° – 40°	17° – 24°C	Mild winter	Sub-tropical deciduous forest
Temperature	40° – 60°	7° – 17°C	Winter with occasional show	Mixed coniferous forest
Arctic and Antarctic	60 – 80°	Below-7°C	Severe prolonged winter with abundant show	Arctic forest

5 (a)

Column I	Column II
(A) Hydrophytes	1. Wet habitat
(B) Mesophytes	2. Moist habitat
(C) Xerophytes	3. Dry habitat

6 (c)

Bergmann's Rule Warm-blooded animals (birds and mammals) of colder areas are of large size as compared to those of warmer areas

Allen's Rule Extremities (ear, snout, tail and legs) of colder areas are shorter than those of warmer region

Ransch's Rule Birds have narrow wing in cold areas as compared to those of warmer areas

Jordan's Rule Fish of colder water tend to have more vertebrae than fish in warm water

7 (a)

Column I	Column II
(A) Rafflesia	1. Phytoparasite (Root parasite)
(B) Hyperparasite	2. Rat flea
(C) Lice	3. Ectoparasite
(D) Taenia	4. Endoparasite

8 (a)

(i) **Diurnal Animals** Active during day time, e. g., butterflies, birds

(ii) **Nocturnal Animals** Active during night, e. g., rat, owl, cockroach

(iii) **Arboreal Animals** Active during dawn, e. g., bualcus

(iv) **Vesperal Animals** Active during dusk, e. g., rabbit

9 (c)

Mutualism or symbiosis (**De Barry**) is a mutually beneficial relationship or interaction between individuals of two different species (+, +) with none of the two capable of living separately. One of the examples of this interaction is orchid ophrys and **bee**.

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**.

Cornel's (1961) elegant field experiments showed that on the rocky sea coasts of Scotland, the larger and competitively superior barnacle *Balanus* dominated the intertidal area and excludes the smaller barnacle *Chathamalus* from the zone.

A **sparrow** eating any **seed** is a predator. Although animals eating plants are categorized separate herbivores, they are, in a broad ecological context, not very different form predators.



- 10 (d)
Ectoparasite which live on the outer surface of the host like ticks, mites, lice, etc. They have the special organs for attaching to their host
Endoparasite are the parasite which live on the inner surface of the host. They have very complex body organisation.
 e. g., Ascaris, Plasmodium vivax
Brood parasite also called social parasite in which parasite bird lays eggs to nest of their host, e. g., cuckoo (koel)

- 11 (d)
 Different movements in plants are
Phototropism Plant shoot bend toward the source of light. This phenomenon is called phototropism
Photonasty Flowers of some plants open or close in response to light and darkness. This phenomenon is called photonasty
Nyctinasty The folding of leaves in response to darkness is called Nyctinasty. Planaria and earthworm generally show negative phototaxis

12 (a)

Column I		Column II	
(A)	Pink cotton bollworm	1.	Diapause
(B)	Zooplankton	2.	Diapause
(C)	Snail	3.	Aestivation
(D)	Polar bear	4.	Hibernation

13 (a)

Column I		Column II	
(A)	Hibernation	1.	Northern ground squirrel
(B)	Aestivation	2.	Ground squirrel
(C)	Cryptic appearance	3.	Leaf-like grass hopper
(D)	Mimicry	4.	Monarch butterfly

- 14 (a)
Hygrophytes are the plants of wet areas having soft stems of moderate height, large thin leaves, e. g., *Apluda*, *Rumex*, etc.
Mesophytes are plants of moist habitats with luxuriant vegetative growth. Spines and thorns are absent, e. g., crops and fruit plants
Xerophytes are plants of dry habitats, which are faced with problems of more water loss through transpiration than is the water available from soil, e. g., *Acacia*, *Tamasix*, etc.

15 (c)

Column I		Column II	
(A)	Mortality	1.	Numbers of deaths in population during given period
(B)	Immigration	2.	Individuals of same species coming in population
(C)	Emigration	3.	Individuals of same species going out from population

16 (c)

Term		Explanation	
(A)	Commensalism	1.	Beneficial to one but no effect on other
(B)	Mutualism	2.	Beneficial to both
(C)	Parasitism	3.	Beneficial to one and harmful to other
(D)	Predation	4.	Beneficial to one and inhibitory to other
(E)	Competition	5.	Harmful to both

17 (c)

Soil Type		Soil Porosity	
(A)	Sandy soil	1.	30%
(B)	Loam soil	2.	40%
(C)	Clay soil	3.	50%

Soil Porosity The percentage of soil volume occupied by pore space is called soil porosity

18 (c)

Climatic Conditions in Major Forest Types of India

Forest Type	Mean Annual Temperature	Mean Annual Rainfall	Dry Months
Tropical Rainforest	23 – 27°C	200-350 cm	2-3
Tropical Deciduous Forest	22 – 32°C	90-160 cm	6-8
Temperate Broad Leaved forest	6 – 20°C	100-250 cm	3-5
Temperate Needle Leaved (coniferous) forest	6 – 15°C	50-170 cm	3-5

19 (a)

Logistic growth is also called sigmoid or Ver huest-peart logistic growth. It shows S-shaped curve
Exponential growth is also called geometric growth. It shows J-shaped curve

20 (c)

Column I		Column II	
(A)	Epiphytes	1.	Orchid on mango tree
(B)	Grazing cattle	2.	Cattle egret
(C)	Sea anemore	3.	Chown fish

