35

Organisms and Population

TOPIC 1
Ecology

01 Niche is **[NEET 2018]**

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

Ans. *(d)*

Niche is an ecological component of habitat which is delimited by functioning of an organism. A species may live in more than one niche in diferent stages of its life cycle.

02 Which one of the following pairs is mismatched? **[CBSE AIPMT 2005]**

(a) Savanna — *Acacia* trees
(b) Prairie — Epiphytes
(c) Tundra — Permafrost
(d) Coniferous forest — Evergreen trees

Ans. *(b)*

Prairies contain tall grasses and shrubs
(a) Savanna —*Acacia* trees
(b) Tundra —Permafrost
(c) Coniferous forest—Evergreen trees

03 Keystone species in an ecosystem are those which **[CBSE AIPMT 1997]**

(a) are present in maximum number
(b) are most frequent
(c) attain a large biomass
(d) contribute to ecosystem properties

Ans. *(d)*

Keystone species of an ecosystem is a species that exerts an important regulatory effect on other species in the community, i.e. contributes to ecosystems properties. It maintains higher species diversity in a community by reducing the densities of strong competitors.

04 Niche of a species in an ecosystem refers to its **[CBSE AIPMT 1996]**

(a) function at its place of occurrence
(b) place of its occurrence
(c) competitive ability
(d) centre of origin

Ans. *(a)*

Niche word is used for the functional role of species or population that it plays in its ecosystem.

05 Tropical forests occur in India **[CBSE AIPMT 1994]**

(a) Jammu and Kashmir
(b) Rajasthan
(c) Kerala and Assam
(d) The forests do not occur in India

Ans. *(c)*

Tropical forest occur in India in Assam, Western Ghats and Western Himalayas. Major vegetation made of sal (*Shorea robusta*), shrubs, grasslands and desert community in the regions of decreasing rainfall.

06 Xeric environment is characterised by **[CBSE AIPMT 1994]**

(a) precipitation
(b) low atmospheric humidity
(c) extreme of temperature
(d) high rate of vapourisation

Ans. *(b)*

Xeric environment is characterised by low atmospheric humidity. This environment is found in deserts.

07 Study of inter-relationships between living organisms and their environment is **[CBSE AIPMT 1993]**

(a) Ecology
(b) Ecosystem
(c) Phytogeography
(d) Ethology

Ans. *(a)*

Study of inter relationship between living organisms and their environment is called as Ecology. Ecology may be called environmental biology.

08 The sum total of the population of the same kind of organisms constitute **[CBSE AIPMT 1993]**

(a) colony
(b) genus
(c) community
(d) species

Ans. *(d)*

Species is a group of organisms similar in structure, function and behaviour.

09 What is true for individuals of same species? **[CBSE AIPMT 2002]**

(a) Live in same niche
(b) Live in same habitat
(c) Interbreeding
(d) Live in different habitats

Ans. *(c)*

According to the biological concept of species. **Species** is a group of organisms which can interbreed freely in nature and produce fertile offsprings.

10 Which part of the world has high density of organisms?

[CBSE AIPMT 1999]

(a) Deciduous forests
(b) Grasslands
(c) Savannas
(d) Tropical rain forests

Ans. *(d)*

The tropical rain forests are most diverse and highly dense with maximum productivity (approximately 12000 kcal/m^2/yr).

11 An association of individuals of different species living in the same habitat and having functional interactions is

[CBSE AIPMT 2015]

(a) ecological niche
(b) biotic community
(c) ecosystem
(d) population

Ans. *(b)*

An association of individuals of different species living in the same habitat and having functional interaction is called biotic community (biocoenosis). The biotic community is dominated by one of the character. It determines the nature of community. It can be biotic or abiotic.

12 Competition for light, nutrients and space is most severe between **[CBSE AIPMT 1988]**

(a) closely related organisms growing in different niches
(b) closely related organisms growing in the same area/niche
(c) distantly related organisms growing in the same habitat
(d) distantly related organisms growing in different niches

Ans. *(b)*

Niche word was used for the first time by **Joseph Grinnel** (1917). Niche means functional role of an organism in an ecosystem. Competition becomes most severe between the closely related organisms which share same niche.

TOPIC 2
Ecological Factors

13. Match the organisms in Column I with habitats in Column II

[NEET (Odisha) 2019]

Column I	Column II
1. Halophiles	i. Hot springs
2. Thermoacidophiles	ii. Aquatic environment
3. Methanogens	iii. Guts of ruminants
4. Cyanobacteria	iv. Salty area

Select the correct option from the following

	1	2	3	4
(a)	(iv)	(i)	(iii)	(ii)
(b)	(i)	(ii)	(iii)	(iv)
(c)	(iii)	(iv)	(ii)	(i)
(d)	(ii)	(iv)	(iii)	(i)

Ans. *(a)*

The correct match of organisms with their habitats are

Halophiles live in salty areas

Thermoacidophiles live in hot springs

Methanogens live in guts of ruminants

Cyanobacteria live in aquatic environment

14 It is much easier for a small animal to run uphill than for a large animal, because

[NEET 2016, Phase I]

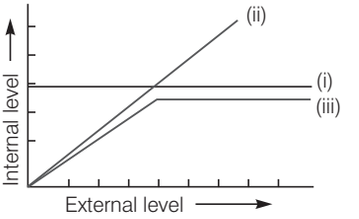
(a) smaller animals have a higher metabolic rate
(b) small animals have a lower O_2 requirement
(c) the efficiency of muscles in large animals is less than in the small animals
(d) it is easier to carry a small body weight

Ans. *(a)*

Basal metabolic rate is inversely proportional to body size. So, smaller animals have a higher metabolic rate, thus have quick and more energy required to go up the hills.

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

[CBSE AIPMT 2010]



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

Ans. *(d)*

In the given diagrammatic representation of response of organisms to abiotic factors

(i) **Regulator** Some organisms are able to maintain homeostasis by physiological (sometimes behavioural also) means which ensures constant body temperature, constant osmotic concentration, etc. They are known as regulators.

(ii) **Conformer** Most animals and plants cannot maintain a constant internal environment. Their body temperature changes with the ambient temperature. These animals and plants are simply called conformer.

(iii) **Partial regulator** During the course of evolution, the costs and benefits of maintaining a constant internal environment are taken into consideration. Some species have evolved the ability to regulate but only over a limited range of environmental conditions, beyond which they simply conform. They are partial regulators.

16 Consider the following four statements (I-IV) about certain desert animals such as kangaroo rat.

I. They have dark colour and high rate of reproduction and excrete solid urine.

II. They do not drink water, breathe at a slow rate to conserve water and have their body covered with thick hairs.
III. They feed on dry seeds and do not require drinking water.
IV. They excrete very concentrated urine and do not use water to regulate body temperature.

Which two of the above statements for such animals are true? **[CBSE AIPMT 2008]**

(a) III and I (b) I and II
(c) III and II (d) II and III

Ans. *(c)*

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

17. Annual migration does not occur in the case of **[CBSE AIPMT 2006]**

(a) salmon (b) siberian crane
(c) salamander (d) arctic fern

Ans. *(c)*

Salamander is semiterrestrial lizard-like tailed amphibian that lives under stones, logs and inside cervices. They show hibernation not annual migration.

Salmon are **anadromous**, i.e. they spend their adult lives at sea but return to freshwater to spawn. The pacific species is legandry : after migrating down stream as a smolt a sockeye salmon ranges many hundreds of mile over the pacific for nearly four year and then returns to spawn in the head waters of its parent stream.

Migration is characteristic feature of birds. **Arctic tern** travels about 1100 miles during winter and returns back during summer.

18 In which one of the following pair is the specific characteristic of soil not correctly matched? **[CBSE AIPMT 2004]**

(a) Laterite — Contains aluminium compound
(b) Terra rossa — Most suitable for roses
(c) Chernozems — Richest soil in the world
(d) Black soil — Rich in calcium carbonate

Ans. *(d)*

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

19 In which one of the following habitats does the diurnal temperature of soil surface vary most? **[CBSE AIPMT 2004]**

(a) Shrubland (b) Forest
(c) Desert (d) Grassland

Ans. *(c)*

Deserts have a very hot days and very cold nights. Due to the bare plant cover, the soil of desert is much more exposed to these fluctuations as compared to that of other areas. During day time, the soil becomes hot and in night it frequently, becomes cool.

20 Diffuse porous woods are characteristic of plants growing in **[CBSE AIPMT 2003]**

(a) temperate climate
(b) tropics
(c) alpine region
(d) cold winter regions

Ans. *(b)*

In tropics, there is no sharp distinction between the seasons, hence, there is not much difference in the activity of cambium. In a diffused porous wood, the large sized vessels are distributed through spring wood and autumn wood, e.g. *Syzygium cumini.*

21 Special kinds of roots called pneumatophores are characteristics of the plants growing in **[CBSE AIPMT 2000]**

(a) sandy soils
(b) saline soils
(c) marshy places and salt lakes
(d) dryland regions

Ans. *(c)*

Pneumatophores are specialised roots which grow vertically upwards into the air from roots embedded in the mud. Since, they are loosely constructed, these make gaseous exchange possible for submerged roots. These are found in plants growing in marshes or saline swamps.

22 Temperature changes in the environment affect most of the animals which are **[CBSE AIPMT 1999]**

(a) homeothermic
(b) aquatic
(c) poikilothermic
(d) desert living

Ans. *(c)*

Poikilothermy (cold bloodedness) is a condition of any animal whose body temperature fluctuates considerably with that of its environment. Homeothermy, on the other hand, is the quality of maintaining a constant body temperature.

23 Extremities, tail and ear are relatively shorter in animals living in cooler regions as compared to those inhabiting warmer zones. This is **[CBSE AIPMT 1996]**

(a) Bergman's rule
(b) Jordan's rule
(c) Gloger's rule
(d) Allen's rule

Ans. *(d)*

According to Allen's rule, extremities, tail and ear are relatively shorter in animals living in cooler regions as compared to those inhabiting warmer zones.

24 Desert plants are generally **[CBSE AIPMT 1995]**

(a) viviparous (b) succulent
(c) herbaceous (d) heterophyllus

Ans. *(b)*

Desert plants are generally succulents or fleshy xerophytes, They are referred as drought resisting xerophytes, e.g. *Opuntia, Bryophyllum, Euphorbia, Mesembryanthemum* (ice plant).

25 Sunken stomata is the characteristic feature of **[CBSE AIPMT 1995]**

(a) hydrophyte (b) mesophyte
(c) xerophyte (d) halophyte

Ans. *(c)*

Sunken stomata is the characteristic feature of xerophytes, these stomata are found generally on the lower surface of leaves.

26 Which of the following does not have stomata? **[CBSE AIPMT 1995]**

(a) Hydrophytes
(b) Mesophytes
(c) Xerophytes
(d) Submerged hydrophytes

Ans. ***(d)***

Sub-merged hydrophytes are those plants which live completely inside the water, so there is no need of transpiration that's why these plants do not have stomata, e.g. *Utricularia, Ceratophyllum*.

27 Animals that can tolerate a narrow range of salinity are **[CBSE AIPMT 1994]**

(a) stenohaline (b) euryhaline
(c) anadromous (d) catadromous

Ans. ***(a)***

Animals that can tolerate only a small range of salinity are stenohaline.

28 Soil best suited for plant growth is **[CBSE AIPMT 1993]**

(a) clay (b) loamy
(c) sandy (d) gravel

Ans. ***(b)***

Loamy soil containing about 1 part clay, 2 parts silt and 2 parts sand (20% clay, 40% silt and 40% sand) is best for plant growth because it possesses good aeration, sufficient nutritive salts and good water retaining capacity.

29 Soil particles determine its

(a) texture **[CBSE AIPMT 1992]**
(b) field capacity
(c) water holding capacity
(d) soil flora

Ans. ***(a)***

Soil particles determine its texture. The behaviour of water in the ground is influenced by the type of soil present. Soils are classified according to their particle size as follows:

(i) Gravel – 2 mm – 75 mm
(ii) Sand – 0.05 mm – 2 mm
(iii) Silt – 0.002 mm – 0.05 mm
(iv) Clay – less than 0.002 mm

30 A fertile agricultural soil appears dark coloured at the surface as compared to soil one metre down. The reason for colour of top soil is **[CBSE AIPMT 1992]**

(a) more moisture
(b) rich in organic matter
(c) rich in iron, calcium and magnesium
(d) recent formation

Ans. ***(b)***

Dark colour of soil is due to accumulation of leached organic substances and organic matter which serves as a reservoir of nutrients and water in the soil, aids in reducing compacting and surface crusting and increases water infiltration into the soil.

31 River water deposits **[CBSE AIPMT 1992]**

(a) loamy soil (b) alluvial soil
(c) laterite soil (d) sandy soil

Ans. ***(b)***

River water deposits are found in alluvial soil. It is rich in nutrients and may contain heavy metals. These soils are formed when streams and rivers slow their velocity and suspended soil particles gets deposited on the river bed.

32 Deep black soil is productive due to high proportion of **[CBSE AIPMT 1991]**

(a) sand and zinc
(b) gravel and calcium
(c) clay and humus
(d) silt and earthworm

Ans. ***(c)***

Black soil is productive due to the high proportion of clay and humus, because most of the minerals are present in it.

33 CAM helps the plants in **[CBSE AIPMT 2011]**

(a) secondary growth
(b) disease resistance
(c) reproduction
(d) conserving water

Ans. ***(d)***

CAM plants are mostly succulent xerophytes. The stomata in these plants remain closed during the day. This helps to check the transpiration. In this way, water is conserved.

34 Two different species cannot live for long duration in the same niche or habitat. This law is **[CBSE AIPMT 2002]**

(a) Allen's law
(b) Gause's hypothesis
(c) Dollo's rule
(d) Weismann's theory

Ans. ***(b)***

The principle of competitive exclusion was postulated by Soviet ecologist **G F Gause**. It states that if two species are competing with one another for the same limited resources, then one of the species will be able to use that resource more efficiently than the other and the former will, therefore, eventually eliminate the latter locally.

35 In which of the following plant sunken stomata are found? **[CBSE AIPMT 2001]**

(a) *Nerium* (b) *Hydrilla*
(c) Mango (d) Guava

Ans. ***(a)***

Presence of sunken stomata is an adaptive feature of xerophytic plants. These stomata are partially covered by hairs and cuticle. Sunken stomata are found in *Nerium* to check the transpiration.

Mango is a mesophytic plant.

Hydrilla is a hydrophytic plant.

Guava is also a mesophytic plant.

TOPIC 3
Population

36 Inspite of interspecific competition in nature, which mechanism the competing species might have evolved for their survival ? **[NEET 2021]**

(a) Resource partitioning
(b) Competitive release
(c) Mutualism
(d) Predation

Ans. ***(a)***

Resource partitioning is the phenomenon where division of limited resources occurs by species to help avoid interspecific competition in an ecological niche. If two species compete for the same resource, they could avoid competition by choosing, for instance, different times for feeding or different foraging patterns. Thus, we can say inspite of interspecific competition in nature, competing species evolved a mechanism called resource partitioning for their survival. Other options can be explained as:

Competitive release occurs when one or 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.

Mutualism is the interaction that confers benefits on both the interacting species. Lichens represent an intimate mutualistic relationship between a fungus and photosynthesising algae or cyanobacteria. Both the species benefit in mutualism and both lose in competition in their interactions with each other. In both parasitism and predation only one species benefits (parasite and predator, respectively) and the interaction.

37 In the exponential growth equation $N_t = N_0 e^{rt}$, e represents **[NEET 2021]**

(a) the base of number logarithms
(b) the base of exponential logarithms
(c) the base of natural logarithms
(d) the base of geometric logarithms

Ans. *(c)*

When resources in the habitat are unlimited, each species has the ability to realise fully its innate potential to grow in number, as Darwin observed while developing his theory of natural selection. Then the population grows in an exponential or geometric fashion.

The integral form of the exponential growth can be represented by equation as

$$N_t = N_0^{ert}$$

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.

In exponential growth, a population's per capita (per individual) growth rate stays the same regardless of population size, making the population grow faster and faster as it gets larger.

38 Amensalism can be represented as **[NEET 2021]**

(a) species A (–) : species B (0)
(b) species A (+) : species B (+)
(c) species A (–) : species B (–)
(d) species A (+) : species B (0)

Ans. *(a)*

Amensalism is the relationship between two organisms, where one is hurt.
A prime example of amensalism is penicillin killing bacteria. The bread mould *Penicillium* secretes penicillin that ultimately kills bacteria. In this contact between two organisms, one is destroyed or inhibited, and other remains unaffected. Hence, it is represented as Species A (–); Species B (0).

39 Match the items in **Column I** with those in **Column II**. **[NEET (Oct.) 2020]**

Column I	Column II
A. Herbivores-Plants	(i) Commensalism
B. Mycorrhiza-Plants	(ii) Mutualism
C. Sheep-Cattle	(iii) Predation
D. Orchid-Tree	(iv) Competition

Select the correct option.

	A	B	C	D
(a)	(iv),	(ii),	(i),	(iii)
(b)	(iii),	(ii),	(iv),	(i)
(c)	(ii),	(i),	(iii),	(iv)
(d)	(i),	(iii),	(iv),	(ii)

Ans. *(b)*

Option (b) is correct match, which is as follows

The relationship between herbivores and plants is prey-predator type in which herbivores are predators and plants are the prey.

In mycorrhiza plants association, both species are benefited and thus it represents mutualism. The sheep and cattle show competition for common resources like food, i.e. grass.

Orchid are epiphytes which grow on trees and derive nutrients from it. In this process, trees are neither harmed nor helped. Thus, it is type commensalism relationship.

40 The impact of immigration on population density is **[NEET (Oct.) 2020]**

(a) negative
(b) Both positive and negative
(c) neutralised by natality
(d) positive

Ans. *(d)*

Population density is the member of individuals present per unit area or volume at a given time. It is calculated by the formula D = N/S, where D = Density, N = Total number of individuals and S = Number of units of space. Since immigration increases the number of individuals in an area, population density increase. Thus, immigration has positive impact on population density.

41 According to Alexander von Humboldt **[NEET (Oct.) 2020]**

(a) species richness decreases with increasing area of exploration
(b) species richness increases with increasing area, but only up to limit
(c) there is no relationship between species richness and area explored
(d) species richness goes on increasing with increasing area of exploration

Ans. *(b)*

Alexander von Humboldt was a German naturalist and geographer. He proposed that within a region, species richness increases with increasing explored area, but only up to a limit.

Accordingly, the relation between species richness and area for a wide variety of taxa turn out to be rectangular hyperbola. The relationship appears as a straight line on logarithmic scale and described by the equation : $\log S = \log C = Z \log A$

Where, S–Species richness, A–Area

Z–Regression coefficient,

C–Y-Intercept.

42 Which of the following is not an attribute of a population? **[NEET (Sep.) 2020]**

(a) Natality
(b) Mortality
(c) Species interaction
(d) Sex ratio

Ans. *(c)*

Species interaction is not an attribute of a population. Rest Natality (Birth rate), Mortality (Death rate) and Sex radio are population attributes.

43 Secondary metabolites such as nicotine, strychnine and caffeine are produced by plants for their **[NEET (Sep.) 2020]**

(a) growth response
(b) defence action
(c) effect on reproduction
(d) nutritive value

Ans. *(b)*

A wide variety of chemical substances (i.e. secondary metabolites) that we extract from plants on a commercial scale (nicotine, caffeine, quinine, strychnine, opium, etc) are produced by them (plants) as defence against grazers and browsers.

44 Between which among the following, the relationship is not an example of commensalism?
[NEET (Odisha) 2019]

(a) Orchid and the tree on which it grows
(b) Cattle egret and grazing cattle
(c) Sea anemone and clown fish
(d) Female wasp and fig species

Ans. *(d)*

Among the given examples, relationship between wasp and fig species does not show commensalism. In this relationship, one species derives the benefit and other neither harmed nor benefitted.

Wasp and fig tree show mutualism. Here fig flower is pollinated by wasp and wasp lays its egg into fruit and leaves them there for development.

Other options show examples of commensalism.

45 Carnivorous animals-lions and leopards, occupy the same niche but lions predate mostly larger animals and leopards take smaller ones. This mechanism of competition is referred to as
[NEET (Odisha) 2019]

(a) character displacement
(b) altruism
(c) resource partitioning
(d) competitive exclusion

Ans. *(c)*

Carnivorous animals, lions and leopard, occupy the same niche but lion predates mostly larger animals and leopard takes smaller ones. This is called resource partitioning. It is a mechanism in which there is the division of limited resources by species to help avoid competition in an ecological niche. In any environment, organisms compete for limited resources, so organisms and different species have to find ways to coexist with one another. That is why lions predate mostly larger animals and leopards take smaller ones.

46 Which of the following statements is correct? **[NEET (Odisha) 2019]**

(a) Lichens do not grow in polluted areas
(b) Algal component of lichens is called mycobiont
(c) Fungal component of lichens is called phycobiont
(d) Lichens are not good pollution indicators

Ans. *(a)*

(a) Statement (a) is correct. Lichens do not grow in polluted area. Rest statements are incorrect.

The correct forms of the statements are as follows

(b) Algal component of lichens is called phycobiont.
(c) Fungal component of lichens is called mycobiont.
(d) Lichens are good pollution indicators.

47 *Pinus* seed cannot germinate and establish without fungal association. This is because
[NEET (National) 2019]

(a) it has obligate association with mycorrhizae
(b) it has very hard seed coat
(c) its seeds contain inhibitors that prevent germination
(d) its embryo is immature

Ans. *(a)*

Pinus has an obligate association with mycorrhizae due to which the *Pinus* seeds are unable to germinate and establish in the absence of fungal partner.

Fungus or mycorrhizae help the *Pinus* roots to absorb water and minerals by increasing their surface area. In turn, the fungus derives food from the plant.

48 Match Column I with Column II.

Column I		Column II
A. Saprophyte	(i)	Symbiotic association of fungi with plant roots
B. Parasite	(ii)	Decomposition of dead organic materials
C. Lichens	(iii)	Living on living plants or animals
D. Mycorrhiza	(iv)	Symbiotic association of algae and fungi

Choose the correct answer from the option given below:
[NEET (National) 2019]

	A	B	C	D
(a)	(iii)	(ii)	(i)	(iv)
(b)	(ii)	(i)	(iii)	(iv)
(c)	(ii)	(iii)	(iv)	(i)
(d)	(i)	(ii)	(iii)	(iv)

Ans. *(c)*

A)–(ii), (B)–(iii) , (C)–(iv)(D)–(i)
Saprophytes are decomposers which help in the decomposition of dead organic material, e.g. *Agaricus*. Parasites are the entitites which live on other living plants or animals and derive nutrition from them, e.g. tapeworm in humans. Lichens represent symbiotic association between algae and fungi. Mycorrhiza is symbiotic association of fungi and plant roots.

49 Which one of the following plants shows a very close relationship with a species of moth, where none of the two can complete its life cycle without the other?
[NEET 2018]

(a) Banana (b) *Yucca*
(c) *Hydrilla* (d) *Viola*

Ans. *(b)*

Yucca gloriosa has developed an obligate symbiotic relationship with *Pronuba yuccasella* moth. The moth cannot complete its life cycle with the association of *Yucca* flowers and in turn *Yucca* has no other pollinator.

Hydrilla is a hydrophilous plant while ***Viola*** is an entomophilous plant. **Bananas** are usually parthenocarpic fruits. Therefore, they do not require pollination.

Concept Enhancer The female moth visits the *Yucca* flowers at night and collects pollen in the form of balls. The moth, then inserts its ovipositor into ovary of the flower to lay eggs. The temperature of the ovary is suitable for hatching of *Pronuba's* eggs and works as an incubator. After that, it climbs to the top of the style and pushes the pollen ball into stylar canal. Thus, pollination occurs. Some seeds are eaten by larvae which escape after piercing the ovary wall.

50 Natality refers to **[NEET 2018]**

(a) number of individuals leaving the habitat
(b) birth rate
(c) death rate
(d) number of individuals entering a habitat

Ans. *(b)*

Natality is **birth rate**. It refers to the number of births during a given period in the population that are added to the initial density.

Death rate is termed as mortality. It refers to the number of deaths in the population during a given period. **Immigration** is the number of individuals of the same species that have come into the habitat, on the other hand **emigration** is the number of individuals of the population who left the habitat.

51 Which one of the following population interactions is widely used in medical science for the production of antibiotics? **[NEET 2018]**

(a) Parasitism (b) Mutualism
(c) Commensalism (d) Amensalism

Ans. *(d)*

Amensalism is widely used in medical science for the production of antibiotics.

It involves, the secretion of chemicals called allochemics by one microbial group to harm other microbes, e.g., *Penicillium* secretes chemicals to inhibit the growth of *Staphylococcus* bacteria. These chemicals can be used in medical science for the production of antibiotics. On the other hand, no such chemicals are secreted in parasitism, mutualism and commensalism.

52 In a growing population of a country, **[NEET 2018]**

(a) reproductive and pre-reproductive individuals are equal in number
(b) reproductive individuals are less than the post-reproductive individuals
(c) pre-reproductive individuals are more than the reproductive individuals
(d) pre-reproductive individuals are less than the reproductive individuals

Ans. *(c)*

In a growing population, younger population (or pre-reproductive individuals) size is larger than that of reproductive individuals. Such population is represented by a triangular-shaped age pyramid.

Whereas, the equal number of reproductive and pre-reproductive individuals represents a stable population and the age pyramid is bell-shaped.

Less number of pre-reproductive individuals than reproductive individuals represents declining population and age pyramid appears urn-shaped. The similar case is seen when reproductive individuals are less than the post-reproductive individuals.

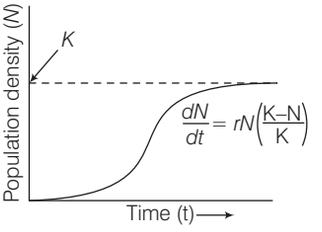
53 Asymptote in a logistic growth curve is obtained, when **[NEET 2017]**

(a) The value of '*r*' approaches zero
(b) $K = N$
(c) $K > N$
(d) $K < N$

Ans. *(b)*

When $K = N$ in a logistics growth curve, it is asymptote.

It means a population growing in a habitat with limited resources show initially a lag phase, followed by phase of acceleration and deceleration and finally an asymptote, i.e. when the population density (N) reaches the carrying capacity (K)



Population growth curve is logistic, when responses are limiting the growth,

here K is carrying capacity and N is population density.

54 Mycorrhizae are the example of **[NEET 2017]**

(a) fungistasis (b) amensalism
(c) antibiosis (d) mutualism

Ans. *(d)*

Mutualism is an association of two species in, which both species are benefitted.

Mycorrhiza is a mutualistic relationship between fungal hyphae and roots of higher plants. The fungus helps in mineral nutrition absorption for the plants with, which they are associated and obtained in turn, nutrients from plants. Concept Enhancer

Amensalism is an interaction between different species, in which one species is harmed and other is neither benefitted nor harmed, e.g. *Penicillium*.

Antibiosis It is an antagonistic association between two or more organism, in which one is adversely affected, e.g. antibiosis includes the relationship between antibiotic and bacteria.

Fungistasis inhibits the growth of fungi.

55 Gause's principle of competitive exclusion states that **[NEET 2016, Phase I]**

(a) Competition for the same resources excludes species having different food preferences
(b) No two species can occupy the same niche indefinitely for the same limiting resources
(c) Larger organisms exclude smaller ones through competition
(d) More abundant species will exclude the less abundant species through competition

Ans. *(b)*

Gause's principle of competitive exclusion states that no two species can occupy the same niche indefinitely for the same limiting resources

56 When does the growth rate of a population following the logistic model equal zero? The logistic model is given as $dN/dt = rN(1-N/K)$ **[NEET 2016, Phase I]**

(a) when N nears the carrying capacity of the habitat
(b) when N/K equals zero
(c) when death rate is greater than birth rate
(d) when N/K is exactly one

Ans. *(d)*

In logistic growth model population growth equation is described as

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

where, N = Population density at time t

r = Intrinsic rate of natural increase

K = Carrying capacity

when, $\frac{N}{K} = 1$ then $\frac{K-N}{K} = 0$

Therefore, $\frac{dN}{dt} = 0$

57 The principle of competitive exclusion was stated by **[NEET 2016, Phase II]**

(a) C Darwin
(b) GF Gause
(c) MacArthur
(d) Verhulst and Pearl

Ans. *(b)*

The principle of competitive exclusion is stated by GF Gause. He studied the effects of interspecific competition between two closely related species.

He stated that two species competing for the same food resource cannot coexist at the same place as highest degree of competitiveness exists between them.

58 If '+' sign is assigned to beneficial interaction, '–' sign to detrimental and '0' sign to neutral interaction, then the population interaction represented by '+' '–' refers to **[NEET 2016, Phase II]**

(a) mutualism
(b) amensalism
(c) commensalism
(d) parasitism

Ans. *(d)*

Parasitism is a relationship between two living organisms of different species in which one organism, i.e. parasite obtains its food directly from the host. In this relationship the parasite is benefitted (+) and the host is harmed (–). So, this type of population interaction is represented by '+' '–'.

59 Which of the following is correct for *r*-selected species? **[NEET 2016, Phase II]**

(a) Large number of progeny with small size
(b) Large number of progeny with large size
(c) Small number of progeny with small size
(d) Small number of progeny with large size

Ans. *(a)*

r-selected are the species having the ability to produce large number of progenies (offsprings) with small size. The population growth of these species is a function of biotic potential. Hence, option (a) is correct.

60 In which of the following interactions both partners are adversely affected? **[CBSE AIPMT 2015]**

(a) Competition (b) Predation
(c) Parasitism (d) Mutualism

Ans. *(a)*

Competition is a negative interaction that occurs among organisms whenever two or more organisms require the same limited resource.

Population Interactions

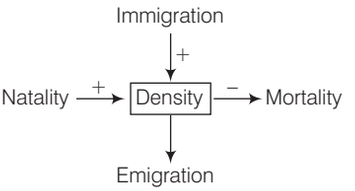
Species A	Species B	Name of Interaction
+	+	Mutualism
–	–	Competition
+	–	Predation
+	–	Parasitism

61 A biologist studied the population of rats in a barn. He found that the average natality was 250, average mortality 240, immigration 20 and emigration 30. The net increase in population is **[NEET 2013]**

(a) 10 (b) 15
(c) 05 (d) zero

Ans. *(d)*

A population has birth rates and death rates. The rates are expressed as change in numbers (increase or decrease) with respect to members of the population.



In this case, the net increases in population will be zero. Because Birth rate (B) + Immigration (I) – Death rate (D) + Emmigration (I) = Density of population.

Therefore, Density
= [250 + 20] – [240 + 30] = 0

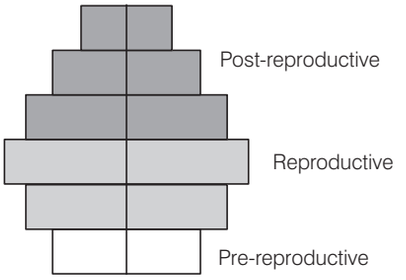
62 A sedentary sea anemone gets attached to the shell lining of hermit crab. The association is **[NEET 2013]**

(a) ectoparasitism (b) symbiosis
(c) commensalism (d) amensalism

Ans. *(b)*

This type of mutualism to called symbiosis. In this type, the sea anemone grows on the back of the hermit crab. It protects the crab with the help of its nematocysts. In ectoparasitism an ectoparasite live on the outside of host, e.g. human body louse. In this interaction, the parasite gets the benefit at the expense of the host. Commensalism is an association between organisms in which one or both the species are benefitted and neither species is harmed. In amensalism one species is harmed, whereas the other is unaffected.

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



[CBSE AIPMT 2011]

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

Ans. *(c)*

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.

64 Consider the following four conditions (I-IV) and select a correct pair of them as adaptation to environment in desert lizards. Conditions **[CBSE AIPMT 2011]**

I. Burrowing in soil to escape high temperature.
II. Losing heat rapidly from the body during high temperature.

III. Bask in sun when temperature is low.
IV. Insulating body due to thick fatty dermis.

(a) III, IV (b) I, III (c) II, IV (d) I, II

Ans. ***(b)***

Desert lizards bask in the sun and absorb heat when their body temperature drops below the comfort zone, but move into shade when the ambient temperature starts increasing. Some species are capable of burrowing into the soil to hide and escape from the above-ground heat.

65 Which one of the following is categorised as a parasite in true sense? **[CBSE AIPMT 2011]**

(a) The female *Anopheles* bites and sucks blood from humans
(b) Human foetus developing inside the uterus draws nourishment from the mother
(c) Head louse living on the human scalp as well as laying eggs on human hair
(d) The cuckoo (koel) lays its eggs in crow's nest

Ans. ***(c)***

Human head louse (*Pediculus*) lives among hair and surface of human body feeding on blood. It spreads diseases like typhus. It is a true parasite.

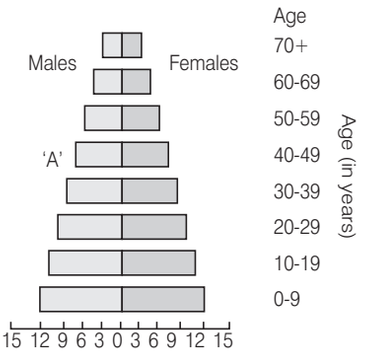
66 Which one of the following is one of the characteristics of a biological community? **[CBSE AIPMT 2010]**

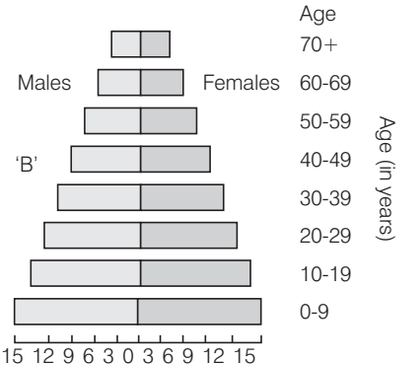
(a) Stratification (b) Natality
(c) Mortality (d) Sex-ratio

Ans. ***(a)***

Organisms are not uniformly distributed throughout a community. They usually occur in definite zones. This spatial arrangement of populations is called stratification which is characteristic of biological community. Natality, mortality, age structure and sex-ratio are the basic characteristics of a population.

67 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 **[CBSE AIPMT 2009]**





(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

Ans. ***(a)***

Interpretation 'a' is correct for the given figures. As 'A' is more recent and shows slight reduction in the growth rate.

68 A high density of elephant population in an area can result in **[CBSE AIPMT 2007]**

(a) mutualism
(b) intraspecific competition
(c) interspecific competition
(d) predation on one another

Ans. ***(b)***

Intraspecific competition is an important density dependent factor regulating populations. Intraspecific competition occurs between the members of same population.

69 The population of an insect species shows an explosive increase in numbers during rainy season followed by its disappearance at the end of the season. What does this show? **[CBSE AIPMT 2007]**

(a) S-shaped or sigmoid growth of this insect
(b) The food plants mature and die at the end of the rainy season
(c) Its population growth curve is of J-type
(d) The population of its predators increases enormously

Ans. ***(c)***

Its population growth curve is J-shaped in which density increases rapidly in exponential fashion and then stops abruptly as environmental resistance or another limiting factor becomes effective more or less suddenly.

70 Geometric representation of age structure is a characteristic of **[CBSE AIPMT 2007]**

(a) biotic community
(b) population
(c) landscape
(d) ecosystem

Ans. ***(b)***

Geometric representation of age structure is a characteristic of population. In most populations, individuals are of different ages. The proportion of individuals in each age group is called age structure of that population.

71 If the mean and the median pertaining to a certain character of a population are of the same value, the following is most likely to occur **[CBSE AIPMT 2007]**

(a) normal distribution
(b) bi-modal distribution
(c) T-shaped curve
(d) skewed curve

Ans. ***(a)***

For a normal distribution the mean, median and mode are actually equivalent.

72 The formula for exponential population growth is **[CBSE AIPMT 2006]**

(a) $dt/dN = rN$
(b) $dN/rN = dt$
(c) $rN/dN = dt$
(d) $dN/dt = rN$

Ans. ***(d)***

J-shaped form of population growth is mathematically described by an **equation** of **exponential** or **geometric increase,** which is as follows :

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

where, d = rate of change

t = time

N = number of females at a particular time

r = biotic potential of each female

(N can also be considered as the total population and r as the biotic potential of each individual).

73 Niche overlap indicates **[CBSE AIPMT 2006]**

(a) active cooperation between two species
(b) two different parasites on the same host
(c) sharing of one or more resources between the two species
(d) mutualism between two species

Ans. ***(b)***

Niche overlap is a measure of the association of two or more species. This indicate their similar habitat requirement and may also indicate competition if trophic niche/spatial niche is same and food/space is limiting, e.g. two different parasites on the same host.

74 Praying mentis is a good example of **[CBSE AIPMT 2006]**

(a) Mullerian mimicry
(b) warning colouration
(c) social insects
(d) camouflage

Ans. ***(c)***

Praying mantis *(Mantis religiosa)* is a large social insect. It has small triangular head, a long prothorax and an abdomen consisting of ten segments. The wings are well developed and the pincer-like forelegs are modified for grasping prey. It usually inhabits plantation areas. It destroys certain harmful insects so, it is useful.

75 Animals have the innate ability to escape from predation. Examples for the same are given below. Select the incorrect example **[CBSE AIPMT 2005]**

(a) enlargement of body size by swallowing air in puffer fish
(b) melanism in moths
(c) poison fangs in snakes
(d) colour change in *Chamaeleon*

Ans. ***(c)***

Animals resist predation by cryptic colouration, deceptive marking, behavioural defenses and the possession of mechanical or chemical defenses.

Example

Enlargement of body size by swallowing air in puffer fish.

Melanism in moths.

Colour change in *Chamaeleon*.

76 Mycorrhiza is an example of **[CBSE AIPMT 2003]**

(a) endoparasitism
(b) decomposers
(c) symbiotic relationship
(d) ectoparasitism

Ans. ***(c)***

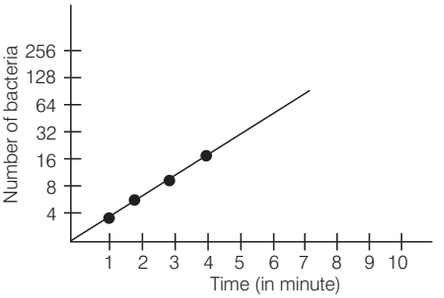
Mycorrhiza is a result of symbiosis between the roots of higher plants and fungi. In this association, plants provide space and prepared food material to fungi in exchange of this, fungi help in absorption of minerals and water to plants.

77 The semilog of per minute growing bacteria is plotted against time. What will be the shape of graph? **[CBSE AIPMT 2002]**

(a) Sigmoid
(b) Hyperbola
(c) Ascending straight line
(d) Descending straight line

Ans. ***(c)***

Semilog of per minute growing bacterium when plotted against time, would yield ascending straight line.



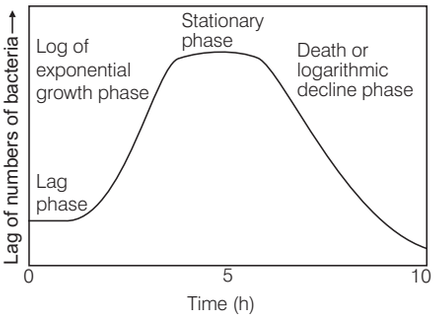
78 Choose the correct sequence of stages of growth curve for bacteria **[CBSE AIPMT 2002]**

(a) lag, log, stationary, decline phase
(b) lag, log, stationary phase
(c) stationary, lag, log, decline phase
(d) decline, lag, log phase

Ans. ***(a)***

When microbes are grown in a closed system or batch culture, the resulting growth curve has usually four phases :

(a) lag phase
(b) exponential (log phase)
(c) stationary phase
(d) death phase



79 Which type of association is found in between entomophilous flower and pollinating agent? **[CBSE AIPMT 2002]**

(a) Mutualism (b) Commensalism
(c) Cooperation (d) Co-evolution

Ans. ***(a)***

A plant and its pollinator have a mutualistic relationship. The plant uses its pollinator to ensure cross pollination while pollinator uses the plant as food.

80 Which of the following is a correct pair? **[CBSE AIPMT 2002]**

(a) *Cuscuta* — Parasite
(b) *Dischidia* — Insectivorous
(c) *Opuntia* — Predator
(d) *Capsella* — Hydrophyte

Ans. ***(a)***

Cuscuta, commonly known as dodder or amarbel, is a parasitic plant.

81 Two different species cannot live for long duration in the same niche or habitat. This law is **[CBSE AIPMT 2002]**

(a) Allen's law
(b) Mendel's law
(c) Gause's competitive exclusion principle
(d) Weismann's theory

Ans. ***(c)***

The principle of competitive exclusion was postulated by Soviet ecologist GF Gause. It states that if two species are competiting with one another for the same limited resource, then one of the species will be able to use that resource more efficiently than the other and the former will, therefore, eventually eliminate the latter locally.

82 An orchid resembling the female of an insect, so as to be able to get pollinated is due to the phenomenon of **[CBSE AIPMT 1998]**

(a) mimicry
(b) pseudocopulation
(c) pseudopollination
(d) pseudoparthenocarpy

Ans. ***(b)***

For its pollination, the orchid *Ophyrys speculum* has picked on the most selective attraction in the entire animal kingdom. It is pollinated by a hairy wasp, *Colpa aurea*. The wasp has a fixed habit whereby its males leave the burrows for above ground existence about four weeks before the females emerge for the open-air mating.

The orcind opens its flowers about the same time the males appear and they possess an appearance and odour similar to those possessed by the famele wasps.

The inexperienced males mistake the *Ophrys* flowers for their female counterparts and land to perform the act of pseudocopulation. The insect repeats the act with a number of orchid flowers and carries pollinia from one flower to another. This insect-plant relationship is beneficial only to the plant.

83 The concept that population tends to increase geometrically while food supply increases arithmetically was put forward by **[CBSE AIPMT 1995]**

(a) Stuart Mill
(b) Adam Smith
(c) Charles Darwin
(d) Thomas Malthus

Ans. ***(d)***

Malthus in his **'Essay on the principle of population'** (1798), pointed out that population tends to increase in geometric progression while food supply increases only in arithmetic progression.

84 Which of the following pair is correctly matched? **[CBSE AIPMT 1995]**

(a) Uricotelism—Aquatic habitat
(b) Parasitism—Intra-specific relationship
(c) Excessive perspiration—Xeric adaptation
(d) Stream lined body—Aquatic adaptation

Ans. ***(d)***

The correct pair is stream lined body to aquatic adaptation which helps these animals in swimming.

85 A mutually beneficial association necessary for survival of both partners are **[CBSE AIPMT 91, 88]**

(a) mutualism/symbiosis
(b) commensalism
(c) amensalism
(d) Both (a) and (b)

Ans. ***(a)***

Mutualism is an association between two organisms of different species where both are benefitted but cannot live separately (both favour the growth and survival of each other and their association is obligatory), e.g. *pollination* by animals, dispersal of fruits and seeds by animals, lichens, etc.

86 The relation between algae and fungi in a lichen is **[CBSE AIPMT 1989]**

(a) symbiosis
(b) parasitism
(c) commensalism
(d) protocooperation

Ans. ***(a)***

The relation between algae and fungi in a lichen is symbiosis. In lichen fungi is for water intake and algae is photosynthetic and prepares food.

87 Phenomenon when organisms resembling others for escaping from enemies is **[CBSE AIPMT 1988]**

(a) adaptation (b) mimicry
(c) homology (d) analogy

Ans. ***(b)***

Mimicry is the phenomenon of resemblance of one species with another. It is a means of adaptation and protection against predation. The species which is copied is called a model, while the animal which copies other is known as mimic, e.g. viceroy butterfly mimics toxic monarch butterfly.

88 Association between sucker fish (Remora) and shark is **[CBSE AIPMT 1988]**

(a) commensalism
(b) symbiosis
(c) predation
(d) parasitism

Ans. ***(a)***

Remora (*Echeneis*) has modified its dorsal fin into a sucker. It attaches to the body of sharks, whales, etc. This type of association is known as commensalism, in which one partner gets benefits while other is not harmed.