For BioResire students


# NEET Biology Material

## Elite Batch

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# ORGANISMS AND POPULATION

## POPULATION

Group of individuals of same species that can interbreed & live in same geographical area.

## POPULATION GROWTH

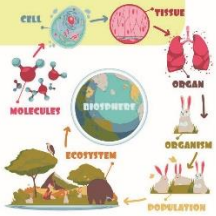
-Change in population density reflects size of population.

-Factors affecting population density:-

- Natality
- Mortality
- Immigration
- Emigration

-Population density is given the equation:-

$N_{t+1} = N_t + ((B + I) - (D + E))$




## GROWTH MODELS

**EXPONENTIAL GROWTH**
( $N_t = N_o e^{rt}$ )
(J-Staped growth)

**LOGISTIC GROWTH**
( $dN/dt = rN\left(\frac{K-N}{K}\right)$ )
(S-Staped growth)

## POPULATION INTERACTIONS

| Species A | Species B | Name of interaction |
|---|---|---|
| + | + | Mutualism |
| - | - | Competition |
| + | - | Predation |
| + | - | Parasitism |
| + | 0 | Commenssalism |
| - | 0 | Amensalism |

+ = Benefited
- = affected
0 = Neutral


## LIFE HISTORY VARIATIONS

R-Selection — High rate of population increase.

K-Selection — Reproduce later in life.


**Major biomes are-**

deserts, Rain forests, tundra, Coastal area, tropical deciduous forests.

**Concerned with ecology are-**

organism, population, communities, biomes.

## FOUR LEVELS OF BIOLOGICAL ORANIZATION

- triangular Pyramid → Expanding
- Bell-Shape Pyramid → Stable
- Urn-Shaped Pyramid → Dedining

Shows age distribution of population & shape of pyramid reflects the growth status of the population.

## POPULATION ATTRIBUTES

- Birth Rate
- Death Rate
- Sex ratio
- Age pyramids
- Population Density

## ADAPTATIONS

To reduce the water less of the cactus, its leaves take the shape of thorns and stems become thicker and store water.

-Adaptation of desert plants (Opuntia).

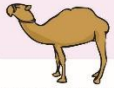
-Adaptation of kangaroo .Rat in North American Deserts.

-Adaptation of mammals for colder climates short ears & limbs, it is called Allen's rule.

i) Physiological: Ability to survive in low oxygen condition at high altitude.

ii) Biochemical adaptations: Ability of fishes to survive in high pressure in deep Oceans.

iii) Behavioral adaptations: Small desert animals live in burrows to escape high heat.



Camels living in a desert climate have long eyelashes against dirt, fat storage in their hump and hairy ears.

## ECOLOGY

Interaction among organisms & Between Organisms & their physical environment.

## RESPONES TO ABIOTIC FACTORS

- Regulate: maintaining homeostasis.
- Conform: constant internal environment.
- Migrate: moving to hospitable environment.
- Suspend: suspension of growth during unfavorable environment.
- Hibernation: winter sleep by bears
- Aestivation: summer sleep

## FACTOR AFFECTING ENVIRONMENT

**Abiotic**

- Light
- Soil
- Temperature
- water

**Biotic**

- Plants
- Bacteria, Fungi
- Animals

# ORGANISMS AND POPULATIONS

## Ecology:

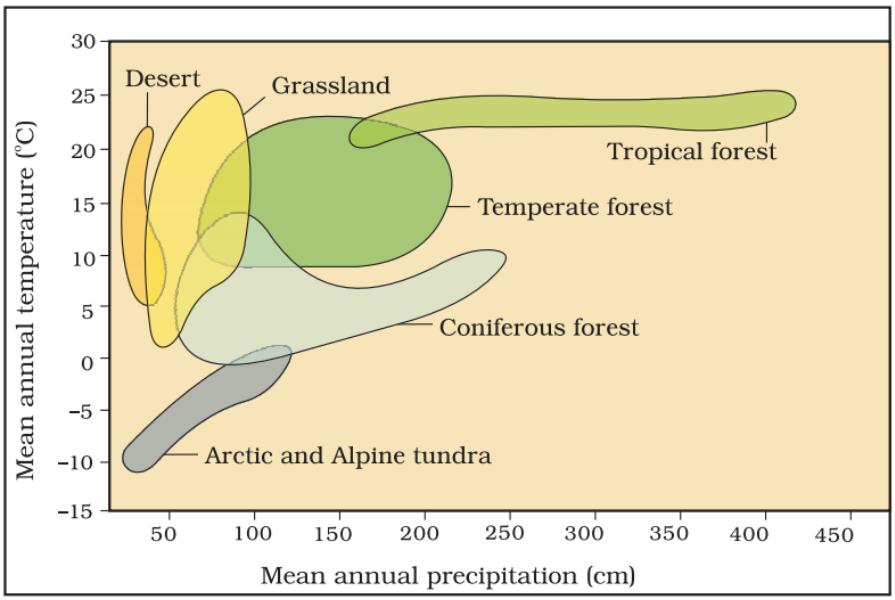
Ecology is the branch of biology that deals with the interactions among organisms and between the organism and its physical (abiotic) environment. Study of ecology is important to strike a balance between development and maintenance of natural environmental and biotic communities, use and conservation of resources, solve local, regional, and global environmental problems.

## Organism and Its Environment:

The branch of science that studied the relationship between the organism and the environment is called ecology.

## Various levels of the organization are:

- **Organism:** each individual belonging to the species.
- **Population:** The group of organisms that are capable of interbreeding.
- **Communities:** A combination of different populations combine together to form communities.
- **Biomes:** A large number of flora and fauna found in a climatic zone.




## Major Abiotic Factor:

The most important biotic factor that affects the environment, as well as organisms, is the temperature. The temperature around the poles is lesser than the temperature found around the equator. The temperature of the polar region ranges from sub zero and increases up to >500C in tropical deserts in summer. The temperature will affect the metabolism rate and physiology of the body as it affects enzyme kinetics. Those organisms that can tolerate a high range of temperature are called eurythermal. E.g., dog, cat, red algae, etc while a large number of organisms tolerate only a narrow range of temperature called

stenothermal. E.g., python, crocodile, penguin. The temperature tolerance of organisms depends upon the type of geographical area they are found.

The other important abiotic factor is water on which life depends. The area where the amount of water is less are called deserts where only organisms that have special adaptations will be able to survive. In the aquatic organism, the composition and pH of the water are very important. The range of salinity for some organisms is quite high called euryhaline, e.g., green crab and molly fish while in some organisms the salinity level tolerance is very low called stenohaline e.g., haddock, goldfish, etc. The organisms of seawater are found to be less adaptive to the marine water and vice versa due to their different osmotic environment.

The other important abiotic factor is light which is useful for the process of photosynthesis and can be observed in the case of autotrophs. The main source of light, well known, is the sun. The requirement of light intensity varies from organism to organism as some organisms require high light intensity while some organisms require low light intensity. There are various types of plants categorized on the basis of the light intensity required, the short-day plants and long-day plants. In animals, the small fluctuation of light will affect the various plant activities that include migration, reproduction, and foraging. The quality of the spectrum of solar radiation is quite important for life. The spectrum consists of ultraviolet radiation which is very harmful to the organisms while the different colors of the visible spectrums are not available for marine organisms found at various depths of the oceans.

The other important abiotic factor affecting organisms and their population is soil. The soil nature and features vary depending upon the type of climate, and the process of weathering, the development of soil, transportation of soil, or whether it is sedimentary. There are various parameters that affect the type of soil that are pH, minerals present in the soil, and the topography. Apart from this, other parameters such as pH, mineral composition, and topography depend upon the type of vegetation and animals present.

**Organisms:** An organism refers to a contiguous living system that lives in an environment and has the ability to adapt and retain certain structure and behaviour. It includes fungi, bacteria, plants, animals, and humans. An organism collectively forms a population. The population forms a community which operates the ecosystem. The ecosystem consists of both biotic and abiotic factors.

Major abiotic factors which lead to variation in the physical and chemical conditions of different habitat are temperature, water, light, and soil.

## Responses to Abiotic Factors:

Various organisms respond differently towards various abiotic factors.

**The various abiotic factor responses are:**

- **Regulators:** They are those organisms that are capable of maintaining homeostasis and regulation resulting in constant body temperature, osmotic concentration, etc. This property can be observed in the case of the birds and mammals along with few vertebrates and invertebrate species. In the case of humans, the body temperature is maintained at 370C resulting in homeostasis. In the summer season when the temperature is very high then

the body sweats profusely in order to maintain the body temperature which is similar to the process of evaporation resulting in cooling. In the winter season, the outer temperature is very low so the body saves continuously to maintain the inner body temperature making it warm. In the case of plants, this mechanism of maintaining the internal body temperature is absent.

- **Conformers:** They are those organisms that are unable to regulate their body temperature. Their body releases or absorbs heat that results in an increase or decrease in body temperature resulting in the process of thermoregulation which is an energetic process. In the case of small animals, the surface-to-volume ratio is larger so the heat of the body can be released quickly, thus, the animals are absent in the polar region. The process of evolution will result in various benefits.

- **Partial Regulators:** They are those species that are capable of regulation but only up to a certain limit depending upon the environmental conditions. The organisms simply undergo confirmation when they cross this limit.

- **Migration:** The movement of animals from one place to another depending upon their requirements. For example, the migratory birds that come every winter from Siberia to Keoladeo National Park (Bharatpur) in Rajasthan due to the stressful conditions in their habitat.

- **Spores:** There are certain microorganisms that include bacteria, fungi, etc to stop their growth during the unfavourable conditions of the environment. As in the winter season, the animals undergo winter sleep called hibernation while in summer they undergo summer sleep called aestivation.

## Adaptations:

The feature that helps the organism to survive or to reproduce in their habitats is called adaptation. It is observed that the organisms usually adapt themselves according to the environment they live in. For example, in the case of the desert plants like Opuntia, they have thick cuticles, leaves modified into spines, and sunken stomata so as to reduce the rate of transpiration and undergo photosynthesis with the help of the CAM pathway. while in the case of the higher altitudes like mountains and hills, humans have shown altitude sickness resulting in nausea, short breaths, fatigue, heart palpitations, etc. But after some time they acclimatize themselves according to the environment and results in the higher production of red blood cells so that more oxygen can bind to them and increases the rate of respiration. There are certain behavioural responses that can be observed in various animals based on the environmental conditions.

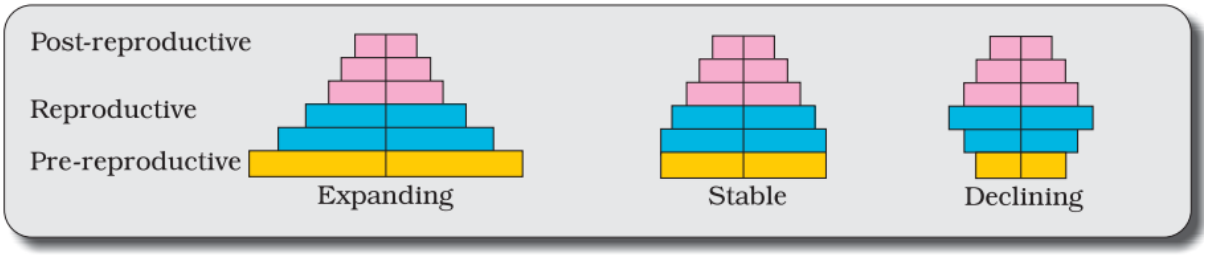
## Population:

Population is defined as a group of individuals or organisms of any species living in a well–defined geographical area, at a specific time with the capability of interbreeding. For example, population of deer in a forest.

## Population Attributes:

- **Birth rate:** Total number of individuals born in a given period of time.

- **Death rates:** Total number of deaths in a period of time.
- **Sex Ratio:** Total number of females and males per 1000 individuals.
- **Age pyramid:** A plot of age distribution.

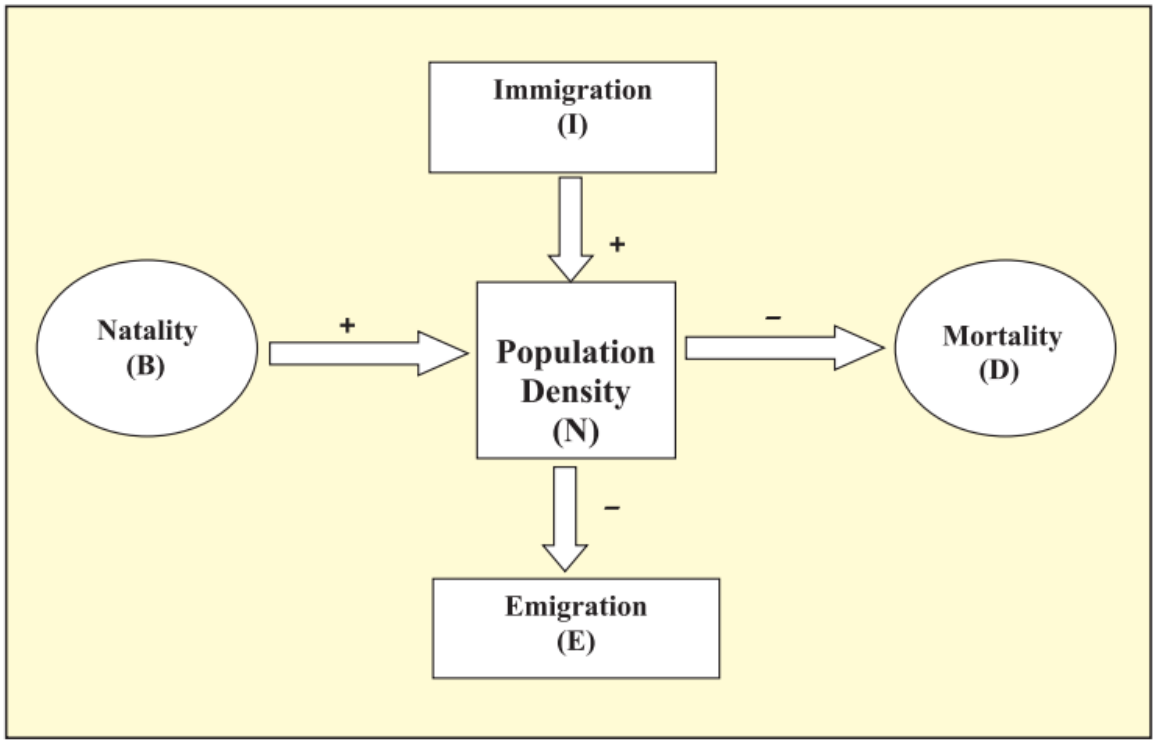



## Population Growth:

Population growth refers to the increase in the number of individuals in a population. This depends on various factors such as weather, food availability, predator pressure, etc.

**The population density changes due to the following factors:**

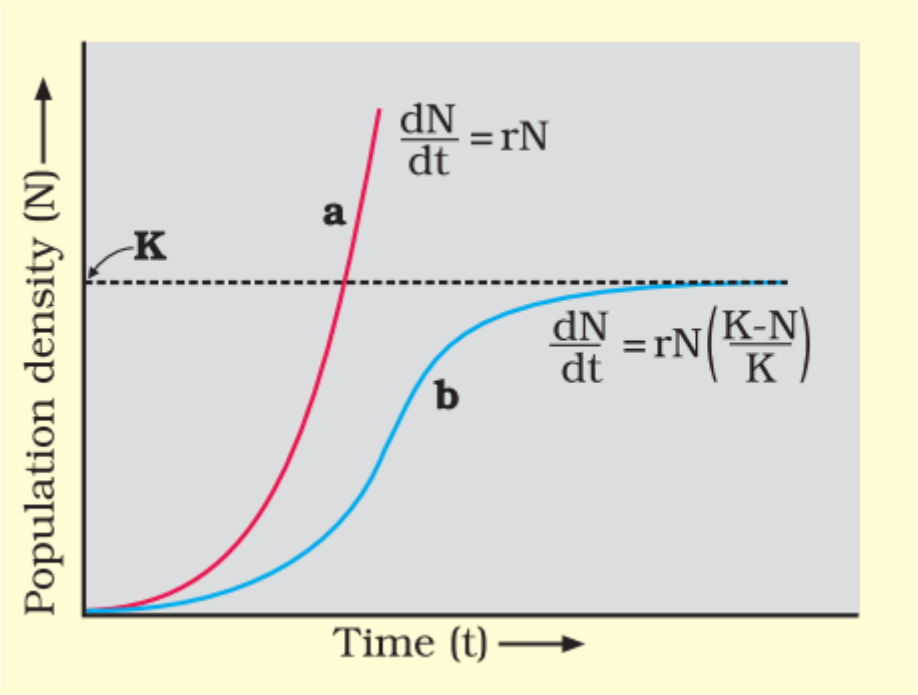
- **Natality:** The number of births in a population in a given time period.
- **Mortality:** The number of deaths in a population in a given time period.
- **Emigration:** The number of individuals who moved to some other habitat in a certain time period.
- **Immigration:** The number of individuals who have come into the habitat from elsewhere in a certain period of time.



## Population Growth Models:

**The population growth models include:**

- **Exponential Growth:** In the limited supply of food, the population follows an exponential growth.
- **Logistic Growth:** When the resources are finite and become limited sooner or later, the population growth is said to be logistic.




**exponential growth equation as:**

$N_t = N_0 e^{rt}$

Where,

$N_t$ = Population density after time t

$N_0$ = Population density at time zero

r = intrinsic rate of natural increase

e = the base of natural logarithms (2.71828)

## Population Interactions:

This refers to the interaction between different populations. There are various modes of population interaction.

**These include:**

- **Predation:** This is a type of interaction in which an organism kills and feeds on another organism. The one who kills is known as the predator and the one who is killed is the prey.

- **Competition:** This is the type of biological interaction between different animals or species in which both are harmed.
- **Parasitism:** Parasitism is a type of interaction between species in which the parasite lives inside the body of another organism and cause harm to it.
- **Commensalism:** In this type of interaction one organism benefits while the other is neither benefitted nor harmed.
- **Mutualism:** In this type of interaction, both the species or organisms are benefitted from each other.

| Species A | Species B | Name of Interaction |
|---|---|---|
| + | + | *Mutualism* |
| – | – | *Competition* |
| + | – | *Predation* |
| + | – | *Parasitism* |
| + | 0 | *Commensalism* |
| – | 0 | *Amensalism* |

# NCERT LINE BY LINE QUESTIONS

1. Who is the Indian father of Ecology? **(Pg. 218, E)**
A) E. hackle B) Ramdeo Mishra C) P. odum D) Tansley

## 13.1 Organism and its Environment

2. For what is the interaction among organisms is necessary **(Pg. 220, E)**
A) Recreation B) Reproduction C) Survival D) Both B and C
3. Basic unit of ecological hierarchy is- **(Pg. 220, E)**
A) Population B) Community C) Ecosystem D) Organism
4. Identify the following which is not correctly matched - (Pg. 220, E)

| | Biome | Mean annual temp.(.c) | Mean annual precipitation (em) |
|---|---|---|---|
| 1) | Tropical forest | 20 – 25 | 130 – 430 |
| 2) | Artic and alpine | -12 – 2 | 10 – 125 |
| 3) | Coniferous forest | -5 – 5 | 100 – 200 |
| 4) | Temperate forest | 8 – 22 | 5 – 225 |

A) 3 B) 1 C) 2 D) 4
5. Different biomes are formed due to annual variations in _____ over the earth's surface**(Pg.220, E)**
A) Temperature B) Precipitation
C) Incident of solar radiation D) All of these
6. Deserts, rainforests, tundra, etc. are example of - **(Pg. 221, E)**
A) Community B) Niche C) Biomes D) Ecosystem
7. The key element that determines difference in environment conditions of different habitats include. **- (Pg. 221, E)**
A) Temperature B) Light C) Soil D) All of these

## 13.1.1 Major Abiotic Factors

8. Study the following statement and select the correct ones. - (Pg. 221, E)
i) Organisms capable to tolerate a wide range of temperature are called stenothermal organisms.
ii) Thermal tolerance of different species determines their geographical distribution to a large extent.
iii) Average temperature in tropical desert in summer is <50ºC.
iv) Thermal spring cannot sustain life due to very high avg. temperature i.e. >100ºC.
A) ii B) i, iii, iv C) i, ii, iv D) iv
9. Organism which tolerate narrow range of temperature- **(Pg. 222, E)**
A) Stenothermal B) Eurithermal C) Eurihaline D) None of these
10. Mango tree do not grow in **(Pg. 222, E)**
A) Temperate country B) Tropical country
C) Sub-tropical country D) None of these
11. Mango do not and cannot grow in the above region. The most important environmental factor responsible for it is- **(Pg. 222, E)**
A) Soil B) Temperature C) Water D) Light
12. Snow leopard are not found in _____ and tuna fish rarely caught beyond _____ latitudes in the ocean. **(Pg. 222, E)**
A) Tropical, Kerala B) Kerala, tropical C) Kerala, temperate D) Kerala, sub-tropical
13. Organism which tolerate wide range of temperature?
A) Eurithermal B) Stenothermal C) Stenohaline D) None of these
14. Match the following salinity. **(Pg. 222, E)**

| | | | |
|---|---|---|---|
| 1 | Sea | a | 5 |
| 2 | Hypersaline Lagoons | b | 30-35 |
| 3 | Inland water | c | >100 |

| | 1 | 2 | 3 | | 1 | 2 | 3 |
|---|---|---|---|---|---|---|---|
| A) | a | c | b | B) | b | c | a |
| C) | c | a | b | D) | b | a | c |

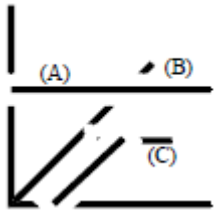
15. A fresh water organisms cannot survive in a water body that has greater _____ than its original habitat- **(Pg. 222, E)**

A) Nutrients B) Depth C) Salt concentration D) Water clarity

## 13.1.2 Responses to Abiotic factor

16. The organism try to maintain the constancy of its internal environment and the process is called **(Pg. 223, E)**

A) Hibernation B) Aestivation C) Homeostasis D) None of these

17. 

**(Pg. 223, E)**

A) A-Regulators, B-Conformers, C-Partial Regulator
B) A-Conformers, B-Regulators, C-Partial Regulator
C) A-Partial Regulator, B-Regulators, C-Conformers
D) A-Conformers, B-Partial Regulators, C-Regulator

18. Regulators maintain homeostatic by which means- **(Pg. 224, E)**

A) Chemical B) Physiological C) Behavioural D) Both B and C

19. We maintain constant body temperature of- **(Pg. 224, E)**

A) 39º C B) 37º C C) 33º C D) 34º C

20. The organism in which body temperature changes according to the ambient temperature is known as **(Pg. 224, E)**

A) Conformers B) Regulator C) Partial Regulators D) Endothermal

21. Thermoregulation is energetically expensive process for **(Pg. 224, E)**

A) Shrews B) Mammals C) Humming bird D) Both A and C

22. Thermoregulation is energetically expensive process for small animals due to their- **(Pg. 224, E)**

A) Small surface area relative to their size B) Large size relative to surface area
C) Both B and A D) Large surface area relative to size

23. The organism which moves away temporarily from stressful situation is known as- **(Pg. 225, E)**

A) Migrators B) Conformers C) Regulators D) Endothermals

24. Keolado National Park is situated in **(Pg. 225, E)**

A) Rajasthan B) Raipur C) Gujarat D) Madhya Pradesh

25. Match the following **(Pg. 223-225, M)**

| A | | B | |
|---|---|---|---|
| 1 | Regulators | i | Humming birds |
| 2 | Conformers | ii | Shrenes |
| 3 | Migrators | iii | Mammals |
| 4 | Suspendors | iv | Siberian birds |
| | | v | Bacteria, fungi and lower plants |

| | 1 | 2 | 3 | 4 |
|---|---|---|---|---|
| A) | i, ii | iii | iv | v |
| B) | iii | i, ii | v | iv |
| C) | iii | i, ii | iv | v |
| D) | iv | iii | i, ii | v |

26. A stage of suspended development is called **(Pg. 225, E)**

A) Diapause B) Aestivation C) Hibernation D) Migration

27. Winter sleep is known as _____ and summer sleep is known as _____. **(Pg. 225, E)**

A) Hibernation, Aestivation B) Migration, Aestivation
C) Aestivation, Hibernation D) Aestivation, Migration

28. Match the following **(Pg. 225, M)**

| A | | B | |
|---|---|---|---|
| 1 | Bear | i | Aestivation |

| | | | |
|---|---|---|---|
| 2 | Zooplankton | ii | Migration |
| 3 | Snail | iii | Hibernation |
| 4 | Siberian clane | iv | Diapause |

| | 1 | 2 | 3 | 4 |
|---|---|---|---|---|
| A) | ii | iv | iii | i |
| B) | iii | iv | i | ii |
| C) | iii | i | iv | ii |
| D) | iv | iii | ii | i |

## 13.1.3 Adaptation

29. Any attributes of the organism that enable them to survive and reproduce its habitat is known as **(Pg. 225, E)**
A) Migration B) Diapause C) Adaptation D) Dormancy

30. Kangaroo rat in _____ American deserts is capable to meet all its water requirement through _____. **(Pg. 225, E)**
A) East, internal fat oxidation B) North, internal fat oxidation
C) North, internal protein oxidation D) West, internal fat oxidation

31. Desert plants have special photosynthetic pathway which is known as- **(Pg. 225, E)**
A) C3 cycle B) C4 cycle C) CAM pathway D) None of these

32. Desert plant do not have following one characteristics-
A) Bread leaf B) Flattened stem C) Sunken stomata D) Thick cuticle

33. Mammals from Colder climates generally have shorter ears and limbs to minimize the heat loss. This Rule was give by- **(Pg. 226, E)**
A) Charles Darwin B) Jansely C) P. Odum D) Allen

34. Desert lizard manage to keep their body temperature constant by _____ means. **(Pg. 226, E)**
A) Physiological B) Behavioural C) Chemical D) Both A and B

35. Many marine aquatics lives in very high pressure. Which type of adaptation shown by them **(Pg. 226, E)**
A) Biochemical B) Behaviourals C) Physical D) None of these

36. Altitude sickness in high altitude is due to- **(Pg. 226, E)**
A) Low atmospheric pressure B) Low oxygen
C) High atmospheric pressure D) Both A and B

## 13.2 Population Attributes

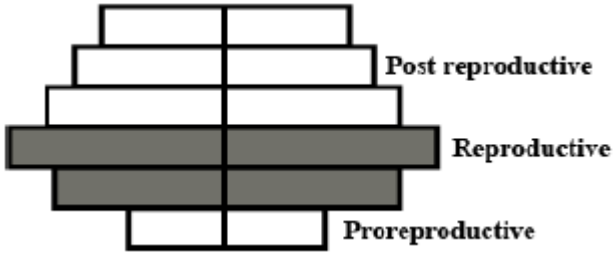
37. What is a group of individual belonging to the same species called- **(Pg. 227, E)**
A) Population B) Biomes C) Community D) Family

38. _____ links ecology to population genetics and evolution **(Pg. 227, E)**
A) Ecosystem B) Biomes C) Population ecology D) Population attributes

39. Population has certain attributes which are- **(Pg. 227, E)**
A) birth rates B) death rates C) sex ratio D) All of these

40. If the age distribution is plotted for the population, the resulting structure is called- **(Pg. 227, E)**
A) Population attributes B) Population ecology
C) Age pyramids D) None of these

41. What type of human population is represented by the following are pyramid? **(Pg. 227, E)**




A) Stable population B) Declining population
C) Expanding population D) Vanishing population

42. The tiger census in our national parks and tiger reserves is after based on- **(Pg. 227, E)**
A) Pug marks B) Fecal pellets C) Counting no. of tigers D) Both A and B

43. _____ is more meaningful measures of the population size of parthenium **(Pg. 228, E)**
A) Total no. B) Biomass C) Age D) None of these

44. The age distribution of a population is determined by: **(Pg. 228, E)**
A) Timing of birth B) Timing of death
C) The rate at which the population is growing D) All are correct

## 13.2.2 Population Growth

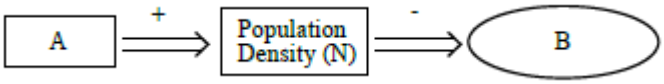
45. What four factors define population growth? **(Pg. 228, E)**
A) Birth, deaths, immigration, emigration
B) Survivorship, age-specific mortally, fecundity, death rate
C) Mark-capture, cenrus, sampling, transects
D) Age-specific birth rates, Metapopulation structure, quad rate, ectone

46. _____ contribute to an increase in population density **(Pg. 228, E)**
A) Natality and emigration B) Mortality and emigration
C) Mortality and Immigration D) Natality and Immigration

47. _____ refers to the no. of deaths in the population during a period . **(Pg. 228, E)**
A) Natality B) Immigration C) Mortality D) Birth rate

48. If N is the population density at time t, then its density at time t + 1 is **(Pg. 228, E)**
A) $N_{t+1} = N_t + (B + E) - (D + I)$ B) $N_{t+1} = N_t + (B + D) - (E + I)$
C) $N_{t+1} = N_t - (B + I) - (D + E)$ D) $N_{t+1} = N_t + (B + I) - (D + E)$

49. Fill up A and B Boxes in the given diagram with correct options: **(Pg. 229, E)**




A) A = Natality + Immigration, B = Mortality + Emigration
B) A = Natality + Mortality, B = Immigration + Emigration
C) A = Birth rate + Death rate, B = Migration + Emigration
D) A = Natality + Emigration, B = Mortality + Immigration

50. A biologist studied the population of rates in a born. He found that average Natality was 260, average Mortality 250, Immigration 30 and emmigration 40. The net increase in population is **(Pg. 229, E)**
A) 10 B) 0 C) 15 D) 20

51. The formula for exponential population growth is **(Pg. 229, E)**
A) dt/dN = rN B) dN/rN = dt C) rN/dN = dt D) dN/dt = rN

52. Which of the following is not a factor that would limit the growth of population? **(Pg. 229, E)**
A) Food shortage B) Immigration C) Disease D) Famine

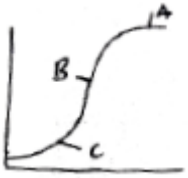
53. Birth rate = B, Death rate = D, Emigration = E and Immigration = I (Pg. 229, E)

| Column I | | Column II | |
|---|---|---|---|
| a | Population is increasing | i | B + I = D + E |
| b | Population is decreasing | ii | B + I < D + E |
| c | Population is stable | iii | B + I > D + E |

| | **a** | **b** | **c** |
|---|---|---|---|
| A) | iii | ii | i |
| B) | ii | iii | i |
| C) | i | ii | iii |
| D) | ii | i | iii |

54. Darwinian fitness is represented by **(Pg. 230, E)**
A) Low r value B) High r value C) High k value D) Low k value

55. What are Labelled phase A, B and C in given sigmoid growth curve? **(Pg. 230, E)**



A) A-Lag, B-Log, C-Stationary B) A-Stationary, B-Log, C-Lag
C) A-Lag, B-Stationary, C-Log D) A-Stationary, B-Lag, C-Log

56. Carrying capacity is denoted as **(Pg. 230, E)**
A) r B) N C) K D) I

57. Figure For calculation of the r value, which of the following is required? **(Pg. 230, E)**
A) Birth rates B) Death rates C) Both a and b D) None

58. Which of the following equation is correct for Logistic growth? **(Pg. 231, E)**
A) $N_t = N_{0e^{rt}}$ B) dN/dt = rN C) dt/dN = rN (K-N/K) D) dN/dt = rN (K-N/K)

59. _____ refers to the no. of births during a given period in the population that are added to the initial density. **(Pg. 231, E)**
A) Natality B) Mortality C) Immigration D) Survival

60. Logistic curve is _____. **(Pg. 231, E)**
A) L-shaped B) J-shaped C) Sigmoid curve D) None of these

61. A plot of N in relation to time (t) results in sigmoid curve. This type of population growth is called- **(Pg. 231, E)**
A) J shaped Curve B) U shaped Curve
C) Verhulst-Pearl Logistic Growth D) Constant Growth

62. Nt = N0ert is the integral form of the exponential- growth equation
Which of the following statement related to equation is not correct: **(Pg. 231, E)**
A) $N_t$ = Population density after time t B) $N_0$= Population density at time zero
C) r = Intrinsic rate of Natural decrease D) e = The base of Natural logarithmics (2.71828)

63. Which growth model is considered as more realistic one? **(Pg. 230, E)**
A) Exponential growth B) Constant growth C) Logistic growth D) None of these

64. A population growing in a habitat with limited resources show initially a __(A)__ followed by phase of __(B)__ and finally __(C)__. **(Pg. 230, E)**
A) A-Lag phase, B-Acceleration and deceleration, C-an asymptote
B) A-Log phase, B-Acceleration and deceleration, C-an asymptote
C) A-Log phase, B-Acceleration and deceleration, C-a symptote
D) A-Log phase, B-Acceleration and deceleration, C-a symptote

65. To calculate the current r value for human population we need to know about **(Pg. 230, E)**
A) Birth rate B) Death rate C) Carrying capacity D) Both A and B

66. Human population follows the _____ as the carrying capacity increase or we do not meet yet our population carrying capacity. **(Pg. 231, E)**
A) J-shaped growth curve B) Z-shaped growth curve
C) S-shaped growth curve D) All of the above

## 13.2.3 Life History Variation

67. Which of the following organism breeds only once on their life time? **(Pg. 232, E)**
A) Pacific salmon fish B) Oyester C) Bamboo D) Both A and C

68. Which of the following organism produces a large no. of small sized offspring? **(Pg. 232, E)**
A) Pacific salmon fish B) Oyester and pelogic fishes
C) Oyester and pacific salmon fish D) Birds and mammals

## 13.2.4 Population Interaction

69. Match the following **(Pg. 232-238, H)**

| | | | |
|---|---|---|---|
| 1 | Both the species benefited | a | Amensalism |
| 2 | Both the species get harmed | b | Mutualism |
| 3 | One species get benefits | c | Pairasitism |
| 4 | One is harmed other species unaffected | d | Predation |
| | | e | Competition |

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

70. Prickly pear cactus caused havoc in the early 1920's in- **(Pg. 233, E)**
A) Canada B) Austria C) India D) Australia

71. Which predator brought the control over the inversive growth of prickly pear cactus **(Pg. 233, E)**
A) Moth B) Bollworm C) Caterpillar D) Grasshopper

72. (A) Chemical control methods are adopted in agricultural pest control, based on ability of predator to regulate prey population.
(B) Penicilium and stryptomyees show Amensalism. **(Pg. 233, M)**
A) A) Statement A is correct B) Statement B is correct
C) Statement A and B both are correct D) Statement A and B are wrong

73. (A) Predators helps in maintaining species diversity in community.
(B) It reduces the intensity of competition among competing prey species. **(Pg. 233, M)**
A) Statement A is correct B) Statement B is correct
C) Both statement is wrong D) Option A and B

74. Starfish Pisaster is **(Pg. 233, E)**
A) Parasite B) Hemi-parasite C) Predator D)Prey of invertebrate

75. More than 10 species of vertebrates disappeared a year after removing the starfish from habitat is due to- **(Pg. 233, E)**
A) interspecific competition B) Brood parasitism
C) Intra specific competition D) None of these

76. Prey species defenses themselves through there behaviour- **(Pg. 233, E)**
A) Camouflaged B) Highly distasteful
C) Poisonous D) All of these

77. Which Butterfly is highly distasteful? **(Pg. 234, E)**
A) Monarch Butterfly B) Viceroy Butterfly
C) Queen Butterfly D) All of these

78. Butterfly is highly distasteful which is acquire by them by tending on poisonous weed during **(Pg.234, E)**
A) Caterpillar Stage B) Adult Butterfly
C) Pupa State D) All of these

79. "Camouflage" means **(Pg. 234, E)**
A) Cryptically coloured B) Feeding on young ones of other species
C) Poisonous D) Feeding on own species

80. Darwin has given the statement of **(Pg. 234, E)**
A) Survival of fittest B) Struggle for existence
C) Both A and B D) None of these

81. Who has convinced that interspecific competition is a patent force in organic evolution? **(Pg. 234, E)**
A) Darwin B) P. odum C) Jansely D) None of these

82. (A) It is generally believed that competition occurs when closely related species complete for same resources that are limiting.
(B) Totally unrelated species could also complete for the same resource. **(Pg. 234, E)**
A) A is true B is false B) Both A and B is false
C) A and B both are true D) A is false and B is true

83. The feeding efficiency of one species might be reduced due to the interfering and inhibitory presence of the other species even if resource are abundant in known as- **(Pg. 234, E)**
A) Interspecific predation B) Interfering competition
C) Both A and B D) commensalism

84. When certain exotic species are introduced in to a geographical area they become invasive mainly because: **(Pg. 235, E)**
A) The invaded land has unlimited resources for the introduced species.
B) The population of the introduced species in the invaded land is very low.
C) Introduced species do not face any competition in the introduced land.
D) The invaded land does not have its natural predator.

85. What was the result, when all pisaster starfish were removed from an enclosed intertidal area, in a field experiment? **(Pg. 234, E)**
A) Extinction of many invertebrate species
B) Increase in diversity of invertebrates

C) Inability of the pisaster to enter the area again
D) Replacement of pisaster by other starfish

86. A species whose distribution is restricted to a small geographical area because of the presence of a competitively superior species is found to expand its distributional range dramatically when the competing species is experimentally removed. This is called- **(Pg. 235, E)**
A) Competitive Exclusion B) Competitive Supermacy
C) Competitive Inclusion D) Competitive Release

87. Which of the following is not a function of predators? **(Pg. 235, E)**
A) They decrease the species competition in a community
B) They act as conduits for energy transfer access trophic levels
C) They help in stabilization of the ecosystem
D) They decrease the species diversity in a community

88. Connell's field experiment on the rockey sea coast of scotland the larger and competitively superior bernacle Balances dominates the intertidal area and excludes the smaller barnacle chathamalus from that zone. This happened due to: **(Pg. 235, E)**
A) Mutualism B) Predation C) Competition D) Parasitism

89. The principle of competitive exclusion was stated by: **(Pg. 235, E)**
A) Gause B) C. Darwin C) Mac Arther D) Connelli

90. Gause's principle of competitive exclusion states that: **(Pg. 235, E)**
A) More abundant species will exclude the less abundant through competition
B) Larger organism will exclude smaller one
C) No two closely related species can occupy same niche indefinitely for the same limiting resources
D) Both A and B

91. In resource partitioning mechanism- **(Pg. 235, E)**
A) Species divide a niche to avoid competition for resources
B) Two different species eat the same thing at the same time of a day
C) Individuals of the same species that compete with each other
D) Two species that share the same niche

92. In accordance with their lifestyles, parasites evolved special adaptations such as _____. **(Pg. 235, E)**
A) the loss of unnecessary sense organs
B) presence of adhesive organs or suckers to ding on to the host
C) loss of digestive system and high reproductive capacity
D) All of the above

93. The human liver fluke (a nematode parasite) depends on two intermediate host to complete its life cycle that is- **(Pg. 235, E)**
A) insect and cow B) insect and human C) a snail and fish D) None of these

94. Mosquito is- **(Pg. 235, E)**
A) Not a parasite B) Parasite C) Endoparasite D) Holoparasite

95. Parasites that feed on the external surface of the host organism are called- **(Pg. 235, E)**
A) endoparasite B) ectoparasite C) Holoparasite D) Hemiparasite

96. Which one is/are the example of ectoparasite? **(Pg. 235, E)**
A) Lice on human B) tick one dogs
C) sea anemone and clown fish D) both A and B

97. Match the following: **(Pg. 235, M)**

| | | | |
|---|---|---|---|
| a | Marine fish | i | Brood parasitism |
| b | Cuscutta | ii | Copepods |
| c | Cattle egret | iii | Grazing cattle |
| d | Koel | iv | Parasite |

| | **a** | **b** | **c** | **d** |
|---|---|---|---|---|
| A) | ii | iv | iii | i |
| B) | iii | iv | i | ii |
| C) | iv | ii | iii | i |
| D) | i | iii | iv | ii |

98. _____ are those that live inside the host body at different sites (Liver, kidney, lungs, red blood cells, etc) **(Pg. 235, E)**
A) endoparasite B) ectoparasite C) Hemiparasite D) Both B and C

99. The life cycle of endoparasite are more complex why? **(Pg. 235, E)**
A) Because of their complex morphology B) Because of their food habit
C) Because of their extreme specialization D) All of these

100. Which of the following group do not comes under commensalism? **(Pg. 236, E)**
A) Orchid growing on Mango branch B) Lichens and fungi
C) Cattle egret and grazing cattle D) Sea Anemone and clown fish

101. Orchid grows as a _____ on a mango branch. **(Pg. 236, E)**
A) Acrophyte B) Parasite C) Epiphyte D) Both A and B

102. Lichens represent an intimate mutualistic relationship between _____. **(Pg. 237, E)**
A) Fungus and algae B) Cyanobacteria and fungus
C) Archaebacteria and fungus D) Both A and B

103. Mycorrhiza are associations between **(Pg. 237, E)**
A) fungi and higher root plants B) fungi and algae
C) Algae and lichen D) Both B and C

104. Who showed that 5 closely related species of Warblers living on same tree were able to avoid competition and co-exist by beharioural difference? **(Pg. 237, E)**
A) C. Darwins B) Connell C) Mac Arther D) Gause

105. (A) The female wasp uses the fig fruit only for oviposition.
(B) Female wasp shows commensalism. **(Pg. 237, E)**
A) A and B both are correct B) A and B both are wrong
C) A is correct B is wrong D) A is wrong and B is correct

106. The Mediterranean orchid employs _____ to get pollination done by a species of bee. **(Pg. 238, E)**
A) Shelter B) Food C) Sexual deceit D) Egg-laying sites

107. Pseudocopulation is an example of- **(Pg. 238, E)**
A) Wasp and fig B) Ophrys and bees C) Ophrys and warp D) None of these

108. If the female bee's colour pattern changes, the orchid flower co-evolves to maintain the resemblance of its petals for the successful pollination is known as **(Pg. 238, E)**
A) Commensalism B) Protocooperation C) Co-evolution D) None of these

## NEET PREVIOUS YEARS QUESTIONS

**1.** Natality refers to : **[2018]**
(a) Death rate (b) Birth rate
(c) Number of individuals entering a habitat (d) Number of individuals leaving the habitat

**2.** 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? **[2018]**
(a) *Hydrilla* (b) *Yucca* (c) *Viola* (d) Banana

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

**4.** In a growing population of a country : **[2018]**
(a) pre-reproductive individuals are more than the reproductive individuals.
(b) reproductive individuals are less than the postreproductive individuals.
(c) pre-reproductive individuals are less than the reproductive individuals.
(d) reproductive and pre-reproductive individuals are equal in number.

**5.** Presence of plants arranged into well defined vertical layers depending on their height can be seen best in : **[2017]**
(a) Tropical Rain Forest (b) Grassland (c) Temperate Forest (d) Tropical Savannah

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

**7.** Artificial selection to obtain cows yielding higher milk output represents : **[2017]**
(a) Directional as it pushes the mean of the character in one direction.
(b) Disruptive as it splits the population into two, one yielding higher output and the other lower output.
(c) Stabilising followed by disruptive as it stabilises the population to produce higher yielding cows.
(d) Stabilising selection as it stabilises this character in the population.

**8.** Select the mismatch : **[2017]**
(a) *Rhodospirillum* – Mycorrhiza (b) *Anabaena* - Nitrogen fixer
(c) *Rhizobium* – Alfalfa (d) *Frankia* - Alnus

**9.** Mycorrhizae are the example of : **[2017]**
(a) Amensalism (b) Antibiosis (c) Mutualism (d) Fungistasis

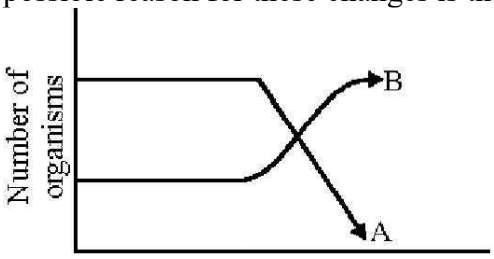
**10.** Gause's principle of competitive exclusion states that : **[2016]**
(a) more abundant species will exclude the less abundant species through competition.
(b) competition for the same resources excludes species having different food preferences.
(c) no two species can occupy the same niche indefinitely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

**11.** 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) **[2016]**
(a) when N/K is exactly one. (b) when N nears the carrying capacity of the habitat.
(c) when N/K equals zero. (d) when death rate is greater than birth rate.

**12.** Most animals are tree dwellers in a : **[2015]**
(a) Thorn woodland (b) Temperate deciduous forest (c) Tropical rain forest (d) Coniferous forest

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

**14.** The following graph depicts changes in two populations (A and B) of herbivores in a grassy field A possible reason for these changes is that : **[2015]**




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

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

16. 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-19 ODISSA)**
(1) Character displacement (2) Altruism (3) Resource partitioning (4) Competitive exclusion

17. Between which among the following, the relationship is not an example of commensalism? **(NEET-19 ODISSA)**
(1) Orchid and the tree on which it grows (2) Cattle Egret and grazing cattle
(3) Sea Anemone and Clown fish (4) Female wasp and fig species

18. Match the items in Column-I with those in Column-II : **(NEET-2020 COVID)**

| 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 from following :
(1) (a)-(iv), (b)-(ii), (c)-(i), (d)-(iii) (2) (a)-(iii), (b)-(ii), (c)-(iv), (d)-(i)
(3) (a)-(ii), (b)-(i), (c)-(iii), (d)-(iv) (4) (a)-(i), (b)-(iii), (c)-(iv), (d)-(ii)

19. The impact of immigration on population density is :- **(NEET-2020 COVID)**
(1) Negative (2) Both positive and negative
(3) Neutralized by natality (4) Positive

20. Which of the following is not an attribute of the population? **(NEET-2020)**
1) Species interaction 2) Sex ratio 3) Natality 4) Mortality

21. Secondary metabolites such as nicotine, strychnine and caffeine are produced by plants for their **(NEET-2020)**
1) Effect on reproduction 2) Nutritive value 3) Growth response 4) Defence action

22. Amensalism can be represented as **[NEET-2021]**
1) Species A (+); Species B (+) 2) Species A (-) ; Species B (-)
3) Species A (+); Species B (0) 4) Species A (-); Species B (0)

23. Inspite of interspecific competition in nature, which mechanism the competing species might have evolved for their survival? **[NEET-2021]**
(1) Competitive release (2) Mutualism
(3) Predation (4) Resource partitioning

24. In the exponential growth equation $N_t = N_o e^{rt}$ ,e represents **[NEET-2021]**
1) The base of exponential logarithms 2) The base of natural logarithms
3) The base of geometric logarithms 4) The base of number logarithms

25. Match List -I with List – II **[NEET-2021]**

| List – I | List – II |
|---|---|
| a) Allen's Rule | i) Kangaroo rat |
| b) Physiological adaptation | ii) Desert lizard |
| c) Behavioural adaptation | iii) Marine fish at depth |
| d) Biochemical adaptation | iv) Polar seal |

Choose the correct answer from the options given below
1) a-iv, b-i, c-iii, d-ii 2) a-iv, b-i, c-ii, d-iii 3) a-iv, b-iii, c-ii, d-i 4) a-iv, b-ii, c-iii, d-i

26. Assertion (A): A per son goes to high altitude and experiences 'altitude sickness' with symptoms like breathing difficulty and heart palpitations. **[NEET-2021]**
Reason (R): Due to low atmospheric pressure at high altitude, the body does not get sufficient oxygen.
In the light of the above statements, choose the correct answer from the options given below.
1) Both (A) and (R) are true but (R) is not the correct explanation of (A)
2) (A) is true but (R) is false
3) (A) is false but (R) is true
4) Both (A) and (R) are true and (R) is the correct explanation of (A)

27. Which one of the following statements cannot be connected to predation? **[NEET-2022]**
(1) It helps in maintaining species diversity in a community
(2) It might lead to extinction of a species
(3) Both the interacting species are negatively impacted
(4) It is necessitated by nature to maintain the ecological balance

28. While explaining interspecific interaction of population (+) sign is assigned for beneficial interaction, (-) sign is assigned for detrimental interaction and (0) for neutral interaction, which of the following interactions can be assigned (+) for one species and (-) for another species involved in the interaction? **[NEET-2022]**
1) Predation 2) Amensalism
3) Commensalism 4) Competition

29. If '8' Drosophilia in a laboratory population of '80' dies during a week, the death rate in the population is individuals per *Drosophila* per week. **[NEET-2022]**
1) 0.1 2) 10 3) 1.0 4) zero

**30.**Tropical regions show greatest level of species richness because

A. Tropical latitudes have remained relatively undisturbed for millions of years, hence more time was available for species diversification.
B. Tropical environments are more seasonal.
C. More solar energy is available in tropics.
D. Constant environments promote niche specialization.
E. Tropical environments are constant and predictable.
Choose the correct answer from the options given below.
(a) A, C, D and E only
(b) A and B only
(c) A, B and E only
(d) A, B and D only

**[NEET 2024]**

**31.**The equation of Verhulst-Pearl logistic growth is $\frac{dN}{dt} = rN\left[\frac{K-N}{K}\right]$.

From this equation, K indicates:
(a) Intrinsic rate of natural increase
(b) Biotic potential
(c) Carrying capacity
(d) Population density

**[NEET 2024]**

**32.**Match List I with List II

**List I**

A. Robert May

B. Alexander von Humboldt

C. Paul Ehrlich

D. David Tilman

**List II**

I. Species-Area relationship
II. Long term ecosystem experiment using out door plots
III. Global species diversity at about 7 million
IV. Rivet popper hypothesis
Choose the correct answer from the options given below:
(a) A-II, B-III, C-I, D-IV
(b) A-III, B-I, C-IV, D-II
(c) A-I, B-III, C-II, D-IV
(d) A-III, B-IV, C-II, D-I

**33.**Plants offer rewards to animals in the form of pollen and nectar and the animals facilitate the pollination process. This is an example of:
(a) Amensalism (b) Competition
(c)Commensalism (d) Mutualism

**[NEET 2023 Manipur]**

**34.** Match List I with List II.

| | List I<br><br>(Interacting species) | | List II<br>(Name of interaction) |
|---|---|---|---|
| (A) | A Leopard and a Lion in a forest/grassland | (I) | Competition |
| (B) | A Cuckoo laying egg in a Crow's nest | (II) | Brood parasitism |
| (C) | Fungi and root of a higher plant in Mycorrhizae | (III) | Mutualism |
| (D) | A cattle egret and a Cattle in a field | (IV) | Commensalism |

Choose the correct answer from the options given below.
(a) A-I, B-II, C-IV, D-III
(b) A-III, B-IV, C-I, D-II
(c)A-II, B-III, C-I, D-IV
(d) A-I, B-II, C-III, D-IV

**[NEET 2023]**

**35**.If there are 250 snails in a pond, and within a year their number increases to 2500 by reproduction. What should be their birth rate per snail per year?

(a) 10 (b) 9
(c) 25 (d) 15

**[NEET 2023 Manipur]**

**36.** Given below are two statements:
**Statement I :** Gause's 'Competitive Exclusion Principle' states that two closely related species competing for the same resources cannot co-exist indefinitely and competitively inferior one will be eliminated eventually.
**Statement II :** In general, carnivores are more adversely affected by competition than herbivores.
In the light of the above statements, choose the correct answer from the options given below:
(a) Both Statement I and Statement II are false.
(b) Statement I is correct Statement II is false.
(c) Statement I is incorrect but Statement II is true.
(d) Both Statement I and Statement II are true.

**[NEET 2023 Manipur]**

**37.** Match List I with List II.

| | List I | | List II |
|---|---|---|---|

| | | | |
|---|---|---|---|
| (A) | Logistic growth | (I) | Unlimited resource availability condition |
| (B) | Exponential growth | (II) | Limited resource availability condition |
| (C) | Expanding age pyramid | (III) | The percent individuals of pre-reproductive age is largest followed by |
| (D) | Stable age pyramid | (IV) | The percent individuals of reproductive age groups |

Choose the correct answer from the options given below:
(a)A-1 B -2 C-3 D-4
(b)A-2 B -1 C-4 D-3
(c)A-1 B -2 C-4 D-3
(d)A-2 B -1 C-3 D-4

**[NEET 2023]**

**38.**Epiphytes that are growing on a mango branch is an example of which of the following?
(a) Commensalism
(b) Mutualism
(c) Predation
(d) Amensalism

**[NEET 2025]**

**39.** Given below are two statements:
**Statement I:** Fig fruit is a non-vegetarian fruit as it has enclosed fig wasps in it.
**Statement II:** Fig wasp and fig tree exhibit mutual relationship as fig wasp completes its life cycle in fig fruit and fig fruit gets pollinated by fig wasp.
In the light of the above statements, choose the most appropriate answer from the options given below:
(a) Both statement I and statement II are correct
(b) Both statement I and statement II are incorrect
(c) Statement I is correct but statement II is incorrect
(d) Statement I is incorrect but statement II is correct

**[NEET 2025]**

**40.**Which one of the following equations represents the Verhulst-Pearl Logistic Growth of population?
(a) $\frac{dN}{dt} = r\left(\frac{K-N}{K}\right)$
(b) $\frac{dN}{dt} = rN\left(\frac{K-N}{K}\right)$

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

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

**[NEET 2025]**

## NCERT LINE BY LINE QUESTIONS – ANSWERS

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

## NEET PREVIOUS YEARS QUESTIONS-ANSWERS

| | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| **1)** B | **2)** B | **3)** C | **4)** A | **5)** A | **6)** A | **7)** A | **8)** A | **9)** C | **10)** C |
| **11)** A | **12)** C | **13)** D | **14)** A | **15)** d | **16)** 3 | **17)** 4 | **18)** 2 | **19)** 4 | **20)** 1 |
| **21)** 4 | **22)** 4 | **23)** 4 | **24)** 2 | **25)** 2 | **26)** 4 | **27)** 3 | **28)** 1 | **29)** 1 | |
| **30)** a | **31)** c | **32)** b | **33)** d | **34)** d | **35)** b | **36)** b | **37)** d | **38)** a | |
| **39)** b | **40)** b | **41)** | **42)** | **43)** | **44)** | **45)** | **46)** | **47)** | |

## NEET PREVIOUS YEARS QUESTIONS-EXPLANATIONS

**1. (b)** Natality is the birth rate within a population. When compared with the death or mortality rate, the growth or decrease in a population can be determined.

**2. (b)** In obligate mutualism, one organism cannot survive without the other. *Yucca* have an obligate mutualism with a species of moth i.e. *Pronuba*.

**3. (c)** Amensalism/antibiosis, association between organisms of two different species in which one is inhibited or destroyed and the other is unaffected. These are chemicals secreted by one microbial group (*e.g:Penicillium*) which harm other microbes (*e.g:Staphylococcus*). It has no effect on *Penicillium* or the organism which produces it.

**4. (a)** Whenever the pre-reproductive individuals or the younger population size is larger than the reproductive group, the population will be an increasing population.

**5. (a)** The tropical rain forests have five vertical strata on the basis of plants, height i.e., ground vegetation, shrubs, short canopy trees, tall canopy trees and tall emergent trees.

**6. (a)** In logistic growth curve, the curve has an upper asymptote known as carrying capacity (K), obtained when the maximum population size is at = 0. A population growing in a habitat with limited resources shows logistic growth curve. For logistic growth

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

$$\text{If } K = N \text{ then } \frac{K-N}{K} = 0$$

$$\text{the } \frac{dN}{dt} = 0.$$

the population reaches asymptote

**7. (a)** Artificial selection to obtain cow yielding higher milk output will shift the peak to one direction, so this represents an example of directional selection. In stabilising selection, the organisms with the mean value of the trait are selected. In disruptive selection, both extremes get selected.

**8. (a)** *Rhodospirillum* is a facultative anaerobe and free living nitrogen fixer. Mycorrhiza shows symbiotic relationship between fungi and roots of higher plants.

**9. (c)** Mycorrhizae is a symbiotic association between fungi and the roots of higher plants.

**10. (c)**

**11. (a)** In logistic growth model population growth equation is described as:

$$\frac{dN}{dt} = rN\left(1-\frac{N}{K}\right)$$

N = population density at time t;
r = Intrinsic rate of natural increase;
K = carrying capacity
When N/K = 1; 1-N/K = 0
Therefore,dN/dt = 0

**12. (c)** In a tropical rain forest zone, most of the animals prefer to live on trees. The reason is that the floor of forest is full of humidity, decomposing leaves and other organic matters and is the habitat of insects etc.

**13. (d)** Competition occurs for light, food and space among organisms in which all partners are adversely affected in an ecosystem.

**14. (a)** The given graph illustrates that population B got success in the grassy field in comparison to population A.

**15. (d)**

20. Natality – Population attribute
Mortality – Population attribute
Species interaction – Population interaction
Sex ratio – Population attribute

21. A wide variety of chemical substances that humans extract from plants on a commercial scale, such as nicotine, caffeine, quinine, strychnine, opium, etc are produced by plants as defences against grazers and browsers

22. Species A (-);Species B (0)

23. • Inspite of interspecific competition the competing species may co-exist by doing resource partitioning.
• In mutualism two organisms are equally benefitted.
• In predation one organism (Predator) eats the another one (Prey).
• In competition release there occurs dramatical increase in population of a less distributed species when its superior competitor is removed

24. In the exponential growth equation $N_t = N_0 e^{rt}$,

e represents the base of natural logarithms
$N_t$ = Population density after time t
$N_0$ = Population density at time zero
r = Intrinsic rate of natural increase called biotic potential

25. Allen's Rule - Polar seal
Physiological adaptation - Kangaroo rat
Behavioural adaptation - Desert lizard
Biochemical adaptation - Marine fish at depth

26. Altitude sickness can be experienced at high altitude where body does not get enough oxygen due to low atmospheric pressure and causes nausea, fatigue and heart palpitations. Hence correct option is (4) as [R] is correct explanation of [A].

27. Predator (+), Prey (–)

28. Predator (+) (beneficial), Prey (–) (detrimental)

29. $\text{Death rate} = \frac{\text{no.of individuals died}}{\text{Initial population}}$

$= \frac{8}{80} = 0.1$

**30.Ans. (a)**
**Explanation**
Only statement B is incorrect because tropical environments unlike temperate ones, are less seasonal, relatively more constant and predictable.
Thus statements A, C, D and E are correct.

**31.Ans. (c)**
**Explanation**
In the equation $\frac{dN}{dt} = rN\left(\frac{K-N}{K}\right)$, K represents carrying capacity.

**32.Ans.(b)**
**Explanation**
Robert May places the global species diversity at about 7 million.
Alexander von Humboldt gave species-area relationship.
Paul Ehrlich used an analogy "Rivet popper hypothesis" to explain the role of species in the ecosystem. David Tilman performed long term ecosystem experiments using out door plots

**33.Ans. (d)**
**Explanation**
This is an example of Mutualism. Mutualism is a type of symbiotic relationship in which both organisms involved benefit. In this case, the plant benefits by having its pollen dispersed by the animal, thus facilitating pollination, and the animal benefits by obtaining food in the form of pollen and nectar.
Therefore, the correct answer is Option d : Mutualism.

**34.Ans.(d)**
**Explanation**

- A leopard and a lion in a forest/grassland (A) : These two species are predators that hunt in the same environment and likely compete for the same prey. This is an example of competition (I).
- A cuckoo laying an egg in a crow's nest (B) : The cuckoo is known for laying its eggs in the nests of other birds, such as crows. The crow then raises the cuckoo's young, often at the expense of its own offspring. This is a form of brood parasitism (II).

- Fungi and the root of a higher plant in mycorrhizae (C) : Mycorrhizae are symbiotic relationships between fungi and plant roots, in which the fungi help the plant absorb water and nutrients from the soil, while the plant provides the fungi with carbohydrates. This is an example of mutualism (III).
- A cattle egret and a cattle in a field (D) : Cattle egrets are often seen near cattle, feeding on the insects that the cattle stir up as they move and graze. The egret benefits from this interaction (by getting easy access to food), while the cattle are unaffected. This is an example of commensalism (IV).

Given this information, the correct match is:**Option d :**A-I, B-II, C-III, D-IV

**35.Ans.(b)**
**Explanation**
Birth rate $= \frac{\Delta N}{N\Delta t}$
Here, $N = 250$

$$\Delta t = 1 \text{ year}$$

$\Delta N = 2500 - 250$
$= 2250$

$$\text{Birth rate } = \frac{2250}{250 \times 1}$$
$$= 9$$

**36.Ans. (b)**
**Explanation**
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. Thus, statement I is correct.
Statement II is incorrect as in general, herbivores and plants appear to be more adversely affected by competition than carnivores.

**37.Ans. (d)**
**Explanation**
Choose the correct answer from the options given below: - Logistic growth (A) is a type of population growth that occurs under conditions of limited resources (II).

- Exponential growth (B) is a type of population growth that occurs under conditions of unlimited resources (I).
- An expanding age pyramid (C) represents a population where the percentage of individuals in the pre-reproductive age group is the largest, followed by the reproductive and post-reproductive age groups (III).
- A stable age pyramid (D) represents a population where the percentage of individuals in the pre-reproductive and reproductive age groups are approximately equal (IV).

So, the correct match is :
A-II, B-I, C-III, D-IV.

**38**.Ans**.(a)**
**Explanation**
In commensalism, one species benefits while the other is neither harmed nor benefited. Epiphytes growing on mango branches gain physical support and access to sunlight, while the mango tree is unaffected. This is a classic example of commensalism.

**39**.Ans**.(b)**
**Explanation**
In many species of fig trees, there is a tight one-to-one relationship with the pollinator species of wasp. It means that a given fig species can be pollinated only by its 'partner' wasp species and no other species. Fig flower is pollinated by wasp. Wasp lays eggs in a fig fruit. The female wasp uses the fruit not only as an oviposition

(egglaying) site but uses the developing seeds within the fruit for nourishing its larvae. The wasp pollinates the fig inflorescence while searching for suitable egg-laying sites. In return for the favour of pollination the fig offers the wasp some of its developing seeds, as food for the developing wasp larvae.

**40**.Ans**.(b)**

**Explanation**

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

This is the Verhulst-Pearl Logistic Growth equation, where:

- N = population size
- $r$ = intrinsic rate of natural increase
- K = carrying capacity
- $\frac{dN}{dt}$ = rate of change in population size

It describes population growth that slows as the population reaches the carrying capacity (K).

## About us

BioResire (NEET | CSIR NET | Biotech Internships) is a life sciences research and training organization dedicated to bridging the gap between academic learning and industry skills. We provide internships, projects, and programs in Bioinformatics, Biotechnology, Molecular Biology, Cancer Research, Neuroscience, and related fields, helping students build job-oriented scientific careers.

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