

QB365

Important Questions - Organisms and Populations

12th Standard CBSE

Biology

Reg.No. :

--	--	--	--	--	--

Time : 01:00:00 Hrs

Total Marks : 50

Section - A

- 1) Lichens are well known combination of an alga and a fungus where fungus has 1  
(a) an epiphytic relationship with the alga (b) a parasitic relationship with the alga  
(c) a symbiotic relationship with the alga (d) a saprophytic relationship with alga
- 2) Animals have the innate ability to escape from predation. Examples for the same are given below. Select the incorrect example. 1  
(a) colour change in chamaeleon (b) enlargement of body size by swallowing air in puffer fish  
(c) poison fangs in snakes (d) melanism in moths
- 3) The ability of the venus fly trap to capture insects is due to 1  
(a) specialized 'muscle-like' cells (b) chemical stimulation by the prey  
(c) a passive process requiring no special ability on the part of the plant (d) rapid turgor pressure changes
- 4) The formula for exponential population growth is 1  
(a)  $dN/dt = \gamma N$  (b)  $dt/dN = \gamma N$  (c)  $dN/\gamma N = dt$  (d)  $\gamma N/dN = dt$
- 5) Niche overlap indicates 1  
(a) mutualism between two species (b) active cooperation between two species  
(c) two different parasites on the same host  
(d) sharing of one or more resources between the two species
- 6) Praying mantis is a good example of 1  
(a) camouflage (b) mullerian mimicry (c) warning colouration (d) social insects
- 7) A high density of elephant population in an area can result in 1  
(a) intra-specific competition (b) inter-specific competition (c) predation on one another  
(d) mutualism
- 8) Match the following with correct combination 1

Column I	Column II
A. Mutualism	1. Tiger and Deer
B. Commensalism	2. Cuscuta and Cissus
C. Parasitism	3. Sucker fish and shark
D. Predation	4. Crab and sea anemone

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

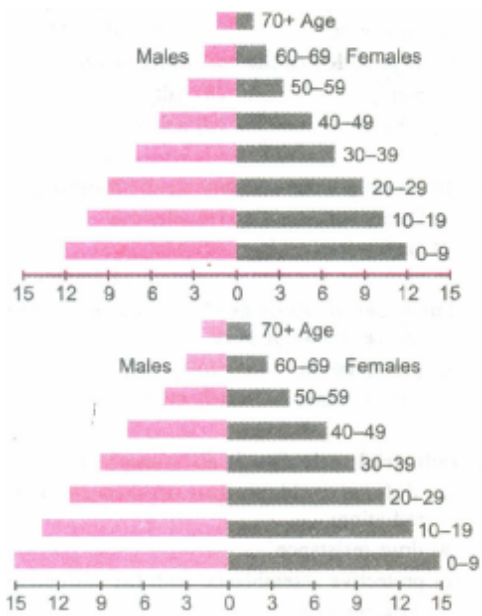
9) Ornithophily refers to pollination by which of the following:

1

- (a) insects (b) birds (c) snails (d) air

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

1



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

### Section - B

11) What is meant by sex ratio? Is it a characteristi of individual or population?

2

12) How do predators help in maintaining species diversity in a community? Give an example.

2

13) Give two evidences for the occurence of competition.

2

14) List three symptoms of high altitude sickness and state three adaptations to overcome it.

2

15) Why is predation required in a community of different organism?

2

16) write a short note on adaptations of desert plants and animals.

2

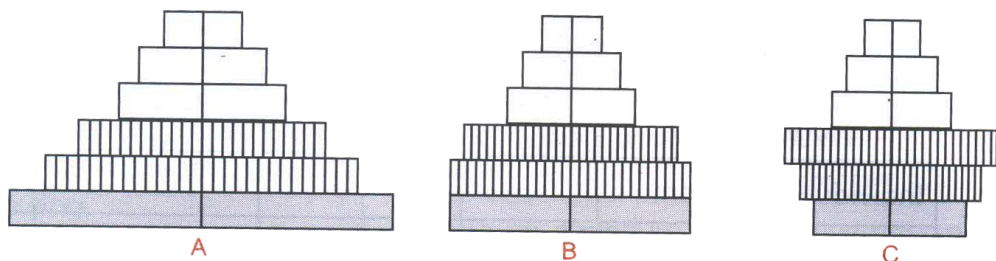
17) Study the three different age pyramids for human population given below and answer questions that follows:

2

Post reproductive

Reproductive

Pre-reproductive

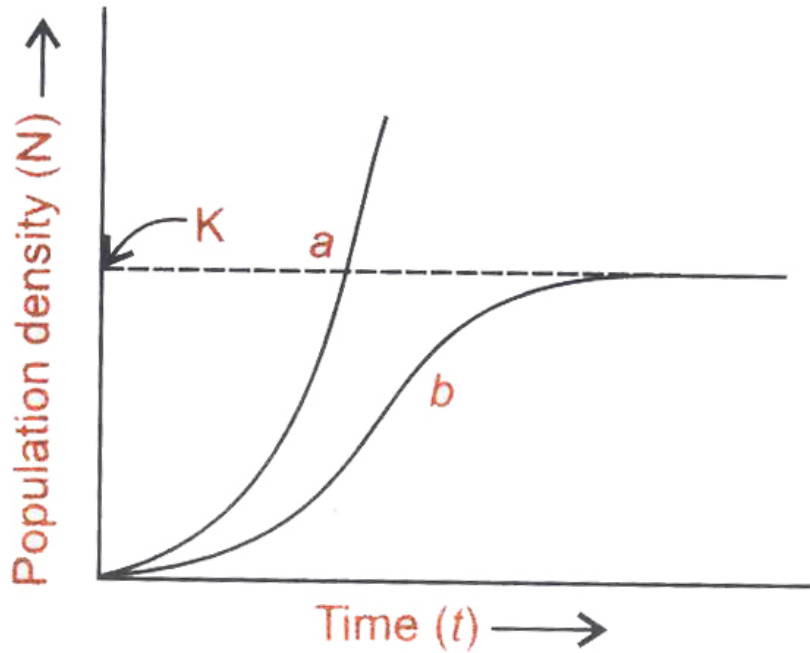


(a) Write the names given to each of these age pyramids.

(b) Mention the one which is ideal for human population and why?

18) Study the population growth curves in the graph given below and answer the questions which follows:

2



(i) Identify the growth curves 'a'

and 'b'. (ii) Which one of them is considered a more realistic one and why? (iii) If  $\frac{dN}{dt} = rN \left( \frac{K-N}{K} \right)$  is the equation of the logistic growth curve, what does K stand for? (iv) What is symbolised by N?

19) Explain the following terms:

2

- (a) Acclimatization
- (b) Ectotherms
- (c) Endotherms

20) Why is the thermoregulation more effectively achieved in larger animals than in smaller ones?

2

### Section - C

21) Organisms remain as individuals but interact as a group with other organisms and physical

5

habitats and behave as population, community, ecosystem, etc. (a) What according to you, are the factors that account for the formation of major biomes? (b) Name any four major biomes of India. (c) What value is learnt from this statement?

22) No species can exist alone in a habitat. Any species has a minimal requirement of at least one more species, on which it can feed. Interspecific interactions arise from the interaction of populations of two different species. (a) What term is given to the interaction, where one species is benefitted and the other is neutral? (b) Give four examples of the above kind of interaction. (c) How do you call the interaction where one species is neutral and the other is harmed? Give an example of such an interaction. (d) What value do you learn from this?

5

23) A population of *Paramecium caudatum* was grown in a culture medium. After 5 days the culture medium became overcrowded with *Paramecium* and had depleted nutrients.

5

What will happen to the population and what type of growth curve will the population attain? Draw the growth curve.

- 24) (i) List the different attributes that a population has and not an individual organism. 5
- (ii) What is population density? Explain any three different ways the population density can be measured, with the help of an example each.

\*\*\*\*\*

**Section - A**

- 1) (c) a symbiotic relationship with the alga 1
- 2) (c) poison fangs in snakes 1
- 3) (d) rapid turgor pressure changes 1
- 4) (a)  $dN/dt = \gamma N$  1
- 5) (d) sharing of one or more resources between the two species 1
- 6) (a) camouflage 1
- 7) (a) intra-specific competition 1
- 8) (b) A-4,B-3,C-2,D-1 1
- 9) (b) birds 1
- 10) (b) 'A' is more recent and shows slight reduction in the growth rate. 1

**Section - B**

- 11) 2  
Sex ratio refers to the ratio between the number of males and the number of females of a given population, at a given time. It is characteristic of a population.
- 12) 2  
Predators help in maintaining species diversity in a community by reducing the intensity of competition among competing prey species. In the rocky intertidal communities of the American Pacific Coast, the starfish Pisaster is a predator. When all the starfish was removed experimentally, more than 10 species of invertebrates became extinct within a year, because of interspecific competition.
- 13) 2  
(i) In some shallow South American lakes, visiting flamingoes and resident fishes compete for their common food, zooplanktons.  
(ii) Abingdon tortoise of Galapagos island became extinct when goats were introduced into the island,
- 14) Symptoms include: 2  
(i) nausea  
(ii) fatigue, and  
(iii) heart palpitations. Adaptations are:  
(i) Increase in breathing rate.  
(ii) Increased production of red blood cells.  
(iii) Decreasing binding capacity of haemoglobin.

- 15) (i) Predation acts as a conduit for energy transfer across trophic levels. 2  
(ii) It keeps the prey population under control.  
(iii) It helps in maintaining species diversity in a community, by reducing the intensity of competition.  
(iv) Biological control of pests is based on the principle of predation.
- 16) 2  
(a) Adaptations of desert plants and animals. 1. Adaptations of desert animals. 1. Animals faced with water scarcity as found in arid or desert areas, show two types of adaptations, reducing water loss and ability to tolerate arid conditions  
Kangaroo Desert Rat seldom drinks water. It has a thick coat to minimise evaporative desiccation. The animal seldom comes out of its comparatively humid and cool burrow during the day time. 90% of its water requirement is met from metabolic water (water produced by respiratory breakdown) while 10% is obtained from food.  
2. Loss of water is minimised by producing nearly solid urine and feces.  
3. Spiny skin and highly cornified in *Phrynosoma* (horned toad) and *Maloch horridus*.  
2. Adaptations of desert plants. 1. Plants have thick cuticle, succulent organs where water and mucilage are stored.  
2. Stomata are sunken.  
3. They have well developed branched root system.  
4. They possess waxy coating on surface.  
5. Crassulacean pathway of photosynthesis.  
6. They  $C_4$  are plants.  
(b) Adaptations of plants to water scarcities. They are called xerophytes. The above mentioned adaptation of plants are applicable (see part (a))  
(c) Behavioural adaptations in animals. (i) Hibernation (ii) Aestivation (iii) Periodic activity (iv) Camouflage migration.  
(d) Importance of light to plants. (1) Source of energy (2) Photoperiodism (3) Pigmentation (4) Daily rhythm (5) Plant movements and (6) Growth.  
(e) Effect of temperature or water scarcity and adaptation of animals. As discussed in (c) and reducing loss of water from body, and ability to tolerate arid condition.
- 17) (a) A - Expanding, B - Stable, C - Declining. 2  
(b) Stable population is preferred. It is helpful for planning any welfare activity.
- 18) 2  
(i) a - Exponential growth curve  
b - Logistic growth curve.  
(ii) Logistic growth curve (b) is considered more realistic one because the resources are finite and become limiting sooner or later.  
(iii) K stands for carrying capacity, the maximum number of individuals of a population, that the given environment can sustain.  
(iv) N symbolises population density, the number of individuals in a given population per unit area.

19)

2

Acclimatization. The gradual physiological adjustment to shoe changing environmental conditions is called acclimatization.

Ectotherms are the cold-blooded animals who can not regulate their body temperature.

Endotherms are the warm-blooded animals who are capable of regulating their body temperatures.

20)

2

Larger animals such as birds and mammals are able to maintain body temperature by physiological means. These have more volume and smaller surface area as compared to smaller animals.

### Section - C

21) (a) The factors include

5

(i) The rotation of the earth around the sun and the tilt of its axis cause annual variation in the intensity and duration of temperature, which affects distinct reasons.

(ii) Annual variation in precipitation.

(b) (i) Scorching deserts of Rajasthan.

(ii) Rain-soaked Meghalaya forests

(iii) Deep ocean trenches.

(iv) Tropical rain forests

(v) High mountain tops. (any four)

(c) Interactions are necessary; they should be beneficial to all.

22)

5

(a) Commensalism

(b) (i) Orchids grow as epiphytes on mango tree or other fruit trees.

- Orchids are benefitted by getting a shelter, while the tree is neither benefitted nor damaged.

(ii) Barnacles growing on the whale are benefitted 'to move where food is available.

(iii) The cattle egrets always forage near to where the cattle animals graze; the cattle animals stir up the ground and the insects are flushed out from the vegetation and make it easy for the egrets to catch them.

(iv) The clown fish living among sea anemones get protection from their predators, which stay away from the stinging tentacles of the sea anemone:

(c) Amensalism

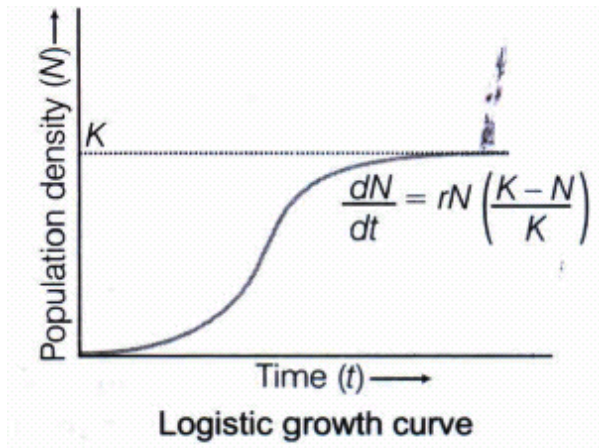
- Roots of certain plants secrete chemicals, which are harmful to the soil organisms.

- The antibiotics secreted by certain soil fungi are harmful to soil . fungi bacteria. . (anyone)

(d) Interactions should be beneficial to all concerned. Avoid selfish or selfcentered people.

Initially, after a lag phase, the population will grow in an exponential manner as the nutrients and space will be abundant. When the food sources get depleted, the population density starts decreasing and ends in an asymptote phase, then the population density reaches the carrying capacity (maximum number of given environment can sustain indefinitely).

The population shows a pattern of logistic growth giving an S-shaped curve. where, K=carrying capacity, N=population density at time 't', r = Intrinsic rate of natural increase



(i) Population attributes are certain characteristic of a population. Some of them are as follows:

(a) Population size or density is the number of individuals of a species per unit area or volume.

Population Density

$$(PD) = \frac{\text{Number of individuals in a region } (N)}{\text{Size of unit area in the region } (S)}$$

$$\text{or, } PD = \frac{N}{S}$$

(b) Birth rate or natality is expressed as the number of births per 1000 individuals of a population per year, e.g. if in a pond, there are 20 lotus plants last year and through reproduction 8 new plants are added

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

(c) Death rate or mortality is expressed as the number of deaths per 1000 individuals of a population per year, i.e. if 4 individuals in a population of 40 fruit flies died during a specified time interval (say a week).

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

(d) Sex ratio is expressed as the number of females and males per 1000 individuals of a population in a given time, e.g. 60% females and 40% males in population.

(e) Age pyramid When the age distribution (percent individuals of a given age or age group) is plotted for the population, this is called age pyramid.

(ii) population density is the number of people living per unit of an area.

Three ways of measuring population density of a habitat.

(a) Percent cover for trees with larger canopy.

(b) Number caught per trap for fishes.

(c) Pug marks or fecal pellets for tiger census.