ORGANISMS AND POPULATIONS

Q.No	Question	Marks				
	Multiple Choice Question					
Q.216	In the image shown below, the dark grey part depicts the geographical distribution of the killer whale.	1				
	Which of these statements describes the killer whale and its habitat					
	 A. Low thermal tolerance and narrow geographical distribution B. High thermal tolerance and narrow geographical distribution C. Low thermal tolerance and widespread geographical distribution D. High thermal tolerance and widespread geographical distribution 					
Q.217	Two statements are given below - one labelled Assertion (A) and the other labelled Reasoning (R).	1				
	Assertion (A): Only stenohaline fish can survive in freshwater.					
	Reasoning (R): Stenohaline fish can tolerate a narrow range of salinity.					
	Which of the following is correct?					
	 A. Both A and R are true, and R is a correct explanation of A. B. Both A and R are true, but R is not a correct explanation of A. C. A is true, but R is false. D. A is false, but R is true. 					
Q.218	The Atlantic salmon is a fish that can tolerate a salinity of 0 to 33 ppt (parts per thousand).	1				
	Which of the following is it likely to be classified as and why?					





	 A. Stenohaline, because it can survive only in freshwater. B. Euryhaline, because it can survive only in marine water. C. Euryhaline, because it can survive major variation in salt concentration. D. Stenohaline, because it can survive only a narrow variation in salt concentration. 	
Q.219	 Every year, millions of monarch butterflies fly from the United States and Canada to Mexico to escape the cold weather. Which response to abiotic stress does the statement depict? A. Migration B. Regulation C. Suspension D. Conformation 	1
Q.220	 Tilapia is a fish found in a variety of freshwater environments and is capable of adjusting its internal salt concentrations to match the salinity of the water. Which response to abiotic stress does the statement depict? A. Migration B. Regulation C. Suspension D. Conformation 	1
Q.221	The adaptations in which of the following animals enables it to satisfy the following conditions: 1. Allen's rule 2. Loses body heat slowly	1





A B C C D	
A. A B. B	
C. C D. D	
Q.222 The population of sparrows inhabiting a garden decreased dramatically. It was found that the mortality was equal to natality for the given population.	1
Which of the following is TRUE for the population of sparrows?	
A. The number of emigrants was equal to immigrants.	
C. The number of emigrants was more than immigrants.	
D. The population of sparrows was unaffected by emigrants and immigrants.	
Q.223 The black walnut plant secretes juglone, a chemical substance that destroys other plants like pepper growing within its root zone.	1
Which type of population interaction does the above statement represent?	
A. Predation	
B. Competition	
D. Amensalism	
Free Response Questions/Subjective Questions	
Q.224 A forest can accommodate a maximum of 500 deer (i.e., its carrying capacity). If the initial population size is 100 deer and the maximum per capita growth rate	2





	is 0.05 per year, calculate the rate of change of the population size of deer for given time period.					
Q.225	Read the news clipping shown below and answer the questions that follow. Image: China plans to increase retirement age as population of elderly people rises China is planning to raise its retirement age gradually and in phases to deal with the ageing population in the country, its state media reported. "People nearing retirement age will only have to delay retirement for several months," Chinese government expert said. Currently, China's retirement age is 60 for men, 55 for white-collar women and 50 for female factory workers. (a) Draw an age pyramid for the above data clearly labelling the post-reproductive, reproductive, and pre-reproductive parts. (b) Name the type of the age pyramid drawn in (a).			3		
Q.226	The surface a compiled in th	rea and volu e table belov Organism X	ume of the bodies of w. Surface Area (cm ²) 3800	f two organisms Volume (cm ³) 1900	(X and Y) are	3
		Y	6.3	0.03		
	 Based on the above table, answer the questions that follow: (a) Calculate the surface area to volume ratio of organisms X and Y. (b) Which of the two organisms is more suited to survive in a cold environment? (c) State your reason for (b) in terms of heat loss. 					
Q.227	A small town 250 births and (a) Calculate th (b) Calculate th (c) Complete t The state (stable/declini to/greater tha (d) Name two population.	has a popula 970 deaths ne birth rate he death rate he following of pop ng/increasin n/lesser thar o other facto	tion of 10,000 people in the town. per thousand for the e per thousand for the statement. ulation in the g) because the birt n) the death rate. ors that would influe	e. In the past yes given population e given populatio town is th rate is ence the density	ar, there were . n (equal v of the given	5
Q.228	A patch of gr August 2022 a average morta	assland was nd Decembe Ility 8, averag	inhabited by 100 go r 2022, it was found th ge immigration 5, and	bats in August 2 hat the average n average emigrat	022. Between atality was 10, ion 3.	2







Q.231	Show below is a graph representing the predator-prey relationship. Answer the questions that follow:	5
	(a) Give one evidence that the ecosystem is stable.	
	(b) What will be effect of migration of rabbits on the population of wolves and why?	
	(c) Name and describe one adaptation that helps preys escape predation.	
	(d) In a hypothetical scenario, all wolves vanish from the ecosystem.	
	(i) What will be the consequence on the vegetation present in the ecosystem and why?	
	(ii) It is found that the population of rabbits does not increase dramatically. State the ecological phenomenon responsible for keeping the population of rabbits in check.	
Q.232	Mistletoe is a plant that grows on the branches of oak trees. It takes nutrients from the oak tree and can weaken or kill it over time.	3
	(a) Identify the host and the parasite.	
	(b) Give one point of similarity and difference between the above scenario and predation.	
Q.233	Population density is calculated by the following formula:	2
	Nt+1 = Nt + [(B+I)-(D+E)]	
	Imagine a population of fish in an artificial lake which acts as a closed system.	
	(a) Which quantity or quantities of the above formula will NOT be used in calculating the population of fish?	
	(b) Give reason for (a).	
Q.234	The following table contains values of the population of seals inhabiting Alaska.	3
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	Year	Number of seals		
	1975	1500		
	1980	3000		
	1985	5500		
	1990	7400		
	1995	7200		
	2000	7100		
	2005	7050		
	2010	7100		
	(a) Based on the values in the table	e above, construct a f growth as soon in	population growth curve.	
0.225	Dead the second is helewood even		ant follow	
	In the Caribbean, there are several species of Anolis lizards that live in the same habitats and feed on similar prey. However, research has shown that when two species have nearly identical body size and feeding habits, one species will outcompete the other for resources, leading to the exclusion of the other species. (a) For the above example of competition to satisfy Gause's Competitive Exclusion Principle, name two conditions that MUST be met. (b) State two ways by which the two species could co-exist in the same habitat.			
Q.236	Read the scenario below about questions that follow.	interference com	petition and answer the	2
	Red squirrels and gray squirrels b nesting sites. Red squirrels are kno and they will often chase gray so sites.	oth live in forests a own to be more agg quirrels away from	and compete for food and ressive than gray squirrels, food sources and nesting	
	(a) The resources present in the ha true or false? Justify your answer.	bitat above must b	e limiting. Is this statement	
	(b) Which species' r-value is likely	to drop and why?		

Q.237	Mark the following statements as TRUE or FALSE and give a reason to support your answer.	3
	(a) Competition happens only between closely-related species.	
	(b) Competition always leads to the elimination of one species.	
	(c) Two species compete only when the resources are limited.	
Q.238	Which one of the following examples can be classified as mutualism? Justify.	2
	(i) Male fireflies use flashing lights to attract females. However, some females will mimic the flash pattern of another species to attract and consume males of that species.	
	(ii) The pitcher plant produces a scent that mimics the scent of ripe fruit, which attracts insects that feed on fruit. When the insects land on the plant, they slip on the slippery surface of the pitcher and fall into the digestive fluid inside.	
	(iii) The night-blooming flowers of senita cacti are visited by tiny senita moths that transfer pollen. The female moth lays eggs on a flower petal and eventually, the larva feeds on the seeds and fruit tissue.	





Answer key and Marking Scheme

Q.No	Answers	Marks
Q.216	D. High thermal tolerance and widespread geographical distribution	1
Q.217	D. A is false, but R is true.	1
Q.218	C. Euryhaline, because it can survive major variation in salt concentration.	1
Q.219	A. Migration	1
Q.220	D. Conformation	1
Q.221	C. C	1
Q.222	C. The number of emigrants was more than immigrants.	1
Q.223	D. Amensalism	1
Q.224	Possible complete answer:	2
	$\frac{dN}{dT} = rN(\frac{K-N}{K})$	
	$_0.05 \times 100(\frac{500-100}{500})$	
	$= 0.05 \times 100 \times 0.8$	
	= 4 deer per year	
	0.5 marks each for the following:	
	- writing the correct formula	
	- substitution	
	- calculation	
	- correct answer	
Q.225	(a)	3
	- 1 mark for drawing the correct shape of age pyramid.	
	- 0.5 marks each for indicating post-reproductive, reproductive, and pre- reproductive	





	Post-reproductive	
	Reproductive	
	Pre-reproductive	
	(b) Declining	
Q.226	(a) 1 mark each for calculating the following:	3
	Organism X = 3800/1900 = 2:1	
	Organism Y = 6.3/0.03 = 210:1	
	(b) Organism X	
	(c) A low surface area to volume ratio means that the organism will lose less heat/retain heat better in a cold environment.	
Q.227	(a) 0.5 mark each for writing the correct formula and arriving at the correct answer:	5
	Birth rate = (Number of births / Total population) x 1000	
	= (250/10000) x 1000	
	= 0.025 x 1000	
	= 25 births per 1000 people	
	(b) 0.5 mark each for writing the correct formula and arriving at the correct answer:	
	Death rate = (Number of deaths / Total population) x 1000	
	= (970/10000) x 1000	
	= 0.097 x 1000	
	= 97 deaths per 1000 people	
	(c) 0.5 mark for each blank:	
	- declining	
	- lesser than	
	(d) 1 mark for each of the following:	
	- immigration/entry of individuals of the same species into the habitat	



	- emigration/exit of individuals of the same species from the habitat	
	[Accept any other valid answer.]	
Q.228	(a) 0.5 mark each for writing the formula and the correct answer	2
	Population density is calculated by the following formula:	
	$N_{t+1} = N_t + [(B+I)-(D+E)]$	
	= 100 + [(10+5)-(8+3)]	
	= 104	
	(b) net increase	
	(c) 4	
Q.229	(a) 0.5 marks for each of the following:	3
	Pyramid 1 - 2020	
	Pyramid 2 - 1980	
	(b) 1 mark for any one of the following for pyramid 1:	
	- More population is in the post-reproductive stage	
	- Pyramid 1 is in the declining phase.	
	1 mark for any one of the following for pyramid 2:	
	- More population is in the pre-reproductive and reproductive stage	
	- Pyramid 2 is in the expanding phase.	
	[Accept any other valid answer.]	
Q.230	(a) 0.5 mark for each of the following:	3
	- marking X axis as time	
	- marking Y axis as population	
	- plotting all values correctly	
	- connecting all the points with a line	





	- Some organisms blend in with their surroundings because of their colour.	
	OR	
	- poisonous	
	 Some organisms are highly distasteful to their predators because of special chemicals present in their body. 	
	(d) 0.5 mark each for writing the effect and reason.	
	- The vegetation will decline.	
	- In the absence of predator, the population of rabbits will no longer be in check. As the population of rabbits increases, the vegetation will reduce.	
	(e) competition with another species	
Q.232	(a) 0.5 mark for each of the following:	3
	- Host - oak tree	
	- Parasite - mistletoe	
	(b) 1 mark for any one of the following similarities:	
	- The parasite and predator benefit from the relationship.	
	- The host and prey are harmed in the relationship.	
	- One species always benefits and the other is always harmed.	
	1 mark for any one of the following differences:	
	- The parasite lives inside or on the host whereas the predator does not.	
	- The parasite may or may not kill the host but the predator always kills the host.	
	[Accept any other relevant answer.]	
Q.233	(a) 0.5 mark for each of the following:	2
	- I (immigration)	
	- E (emigration)	
	(b) A closed system will not have any individual entering it from inside or leaving it by going outside.	
Q.234	(a) 0.5 mark for each of the following:	3



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	(b) 0.5 mark for each of the following:	
	- gray squirrel	
	- Because of the red squirrels aggression, the gray squirrels have limited access to the resources.	
Q.237	(a) 0.5 mark for each of the following:	3
	- False	
	- Unrelated species can also compete for the same resource.	
	(b) 0.5 mark for each of the following:	
	- False	
	 Some species in a competitive relationship might co-exist by resource partitioning. 	
	[Accept any other valid reason.]	
	(c) 0.5 mark for each of the following:	
	- False	
	 Species can also compete when resources are abundant where one species interferes with the feeding patterns of another species. 	
Q.238	1 mark each for identifying the correct example and giving reason.	2
	- (iii)	
	- Reason: Only in (iii), both species are being benefitted.	
	OR	
	In (i) and (ii), one species is being killed.	
	[Accept any other valid reason.]	



