Q. 1 – Q. 5 carry one mark each.

Q.1 If I were you, I _____ that laptop. It's much too expensive. *(GATE EE 2025)*

(A) won't buy
(B) shan't buy
(C) wouldn't buy
(D) would buy

Q.2 He turned a deaf ear to my request.
What does the underlined phrasal verb mean? *(GATE EE 2025)*

(A) ignored
(B) appreciated
(C) twisted
(D) returned

Q.3 Choose the most appropriate set of words from the options given below to complete the following sentence:

_____ _____ is a will, _____ is a way.

(GATE EE 2025)

(A) Wear, there, their
(B) Were, their, there
(C) Where, there, there
(D) Where, their, their

Q.4 (x% of y) + (y% of x) is equivalent to: *(GATE EE 2025)*

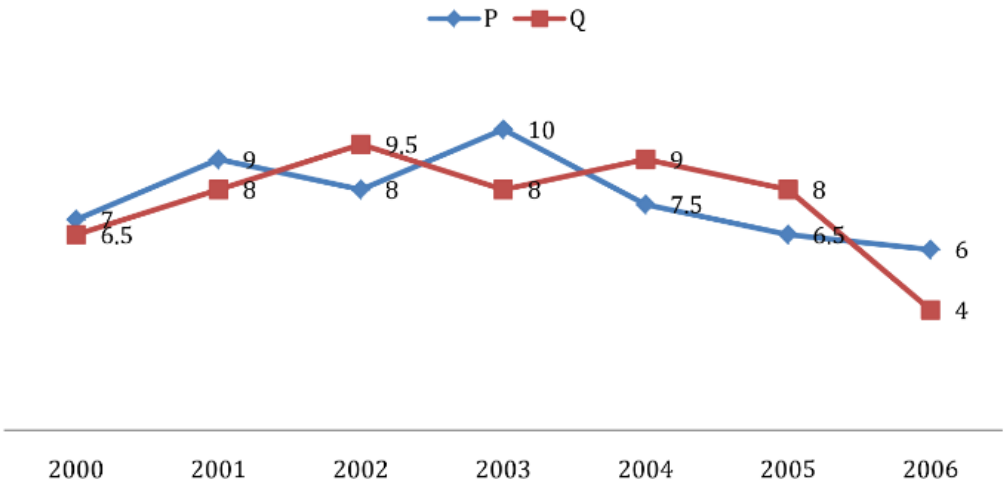
(A) 2% of xy
(B) 2% of $\frac{xy}{100}$
(C) xy% of 100
(D) 100% of xy

Q.5 The sum of the digits of a two digit number is 12. If the new number formed by reversing the digits is greater than the original number by 54, find the original number. *(GATE EE 2025)*

(A) 39
(B) 57
(C) 66
(D) 93

Q.6 – Q.10 carry two marks each.

Q.6 Two finance companies, P and Q, declared fixed annual rates of interest on the amounts invested with them. The rates of interest offered by these companies may differ from year to year. Year-wise annual rates of interest offered by these companies are shown by the line graph provided below.



If the amounts invested in the companies, P and Q, in 2006 are in the ratio 8:9, then the amounts received after one year as interests from companies P and Q would be in the ratio: *(GATE EE 2025)*

(A) 2 : 3
(B) 3 : 4
(C) 6 : 7
(D) 4 : 3

Q.7 Today, we consider Ashoka as a great ruler because of the copious evidence he left behind in the form of stone carved edicts. Historians tend to correlate greatness of a king at his time with the availability of evidence today.

Which of the following can be logically inferred from the above sentences? *(GATE EE 2025)*

(A) Emperors who do not leave significant sculpted evidence are completely forgotten.
(B) Ashoka produced stone carved edicts to ensure that later historians will respect him.
(C) Statues of kings are a reminder of their greatness.
(D) A king's greatness, as we know him today, is interpreted by historians.

Q.8 Fact 1: Humans are mammals.
Fact 2: Some humans are engineers.
Fact 3: Engineers build houses.

If the above statements are facts, which of the following can be logically inferred? *(GATE EE 2025)*

i. All mammals build houses.
ii. Engineers are mammals.
iii. Some humans are not engineers.

(A) II only
(B) III only
(C) I, II and III
(D) I only

Q.9 A square pyramid has a base perimeter x, and the slant height is half of the perimeter. What is the lateral surface area of the pyramid? *(GATE EE 2025)*

(A) x^2
(C) $0.50x^2$
(B) $0.75x^2$
(D) $0.25x^2$

Q.10 Ananth takes 6 hours and Bharath takes 4 hours to read a book. Both started reading copies of the book at the same time. After how many hours is the number of pages **to be** read by Ananth, twice that **to be** read by Bharath? Assume Ananth and Bharath read all the pages with constant pace. *(GATE EE 2025)*

(A) 1
(C) 3
(B) 2
(D) 4

END OF QUESTION PAPER

Ecology – EY

Q. 1 – Q. 25 carry one mark each.

Q.1 Different kinds of limbs, such as the wings of birds and bats, and the flippers of turtles, whales and dolphins, have the same underlying skeletal structure. This is an example of: *(GATE EE 2025)*

(A) Analogy
(B) Convergence
(C) Homology
(D) Genetic drift

Q.2 Forests with a high density of native conifer trees are found in: *(GATE EE 2025)*

(A) Gujarat
(B) Haryana
(C) Himachal Pradesh
(D) Odisha

Q.3 Ozone layer depletion, since the 1970s, is primarily attributed to: *(GATE EE 2025)*

(A) carbon dioxide
(B) chlorofluorocarbons
(C) global warming
(D) UV radiation

Q.4 The evolution of the amniotic egg in reptiles allowed them to: *(GATE EE 2025)*

(A) colonize dry terrestrial environments
(B) give birth to live young
(C) lay eggs in water and on land
(D) live in aquatic environments

Q.5 Which of the following phyla are most closely related to chordates? *(GATE EE 2025)*

(A) Annelida
(B) Arthropoda
(C) Echinodermata
(D) Mollusca

Q.6 Limb lengths were measured for 50 individuals from a population of lizards and the sample variance was calculated to be 64 cm^2. The standard deviation for this sample is _____ cm.*(GATE EE 2025)*

Q.7 Most terrestrial ecosystems have a pyramidal structure of standing biomass across trophic levels where biomass of producers > primary consumers > secondary consumers > tertiary consumers. However, some aquatic ecosystems have an inverted pyramidal structure where the standing biomass of producers < primary consumers. An explanation for this is: *(GATE EE 2025)*

(A) greater efficiency of primary consumers in aquatic ecosystems
(B) high turnover rates of aquatic producers relative to consumers
(C) low nutrient concentrations in aquatic ecosystems
(D) very high light limitation in aquatic ecosystems

Q.8 In an experiment, a PhD student found that the traits, flower colour and seed size, did not follow Mendel's Law of Independent Assortment. A possible explanation for this observation is: *(GATE EE 2025)*

(A) co-dominance between alleles
(B) incomplete dominance
(C) linkage between the traits
(D) loci on different chromosomes

Q.9 Which of the following invertebrates has the lowest gut length:body length ratio? *(GATE EE 2025)*

(A) dragonflies
(B) grasshoppers
(C) leaf hoppers
(D) termites

Q.10 Allopatric speciation occurs when two populations diverge because of geographical separation. Rates of allopatric speciation are likely to be higher in: *(GATE EE 2025)*

(A) marine organisms with active dispersal
(B) marine organisms with passive dispersal
(C) terrestrial organisms with high dispersal ability
(D) terrestrial organisms with low dispersal ability

Q.11 For nearly 200 years, biogeographers have noted that the tropics have more terrestrial species than temperate regions. Which of the following is **NOT** a plausible explanation for this pattern? *(GATE EE 2025)*

(A) Diversification rates are higher in the tropics
(B) Energy inputs are higher in the tropics
(C) There is greater land area in the tropics
(D) Tropical species have greater climatic tolerance

Q.12 If the rate of non-synonymous substitution at a locus exceeds that of synonymous substitution, then: *(GATE EE 2025)*

(A) deleterious mutations are accumulating
(B) evolution is not occurring
(C) genetic drift is operating
(D) selection is operating

Q.13 There are N individuals in a haploid population. At a given locus, there are 2 alleles, AL_1 and AL_2. The number of copies of allele AL_1 is Z_1, and the number of copies of allele AL_2 is Z_2 in the population. What is the frequency of allele AL_2? *(GATE EE 2025)*

(A) Z_1/N
(B) Z_2/N
(C) $Z_1 + Z_2$
(D) $(Z_1 + Z_2)/N$

Q.14 According to Hamilton's Rule, an altruistic act will spread in a population due to kin selection, when $B/C > 1/r$, where B is the benefit to the recipient, C is the cost to the actor and r is the genetic relatedness of the recipient to the actor. Given this relationship, a human may forego producing one of her own offspring to help her full sibling raise offspring, only if it results in at least _____ or more extra offspring produced by her sibling. *(GATE EE 2025)*

(A) 1
(B) 2

(C) 4

(D) 8

Q.15 Which of the following is NOT a plant hormone? *(GATE EE 2025)*

(A) Corticosterone

(B) Ethylene

(C) Jasmonic acid

(D) Salicylic acid

Q.16 Among foraging shore birds, feeding rates (F, number of prey items consumed in 5 minutes) decrease as the number of neighbours (N) increases as follows: $F = 10 - 0.9N$. The maximum feeding rate is _____. *(GATE EE 2025)*

Q.17 Which of the following is NOT an adaptation to reduce the risk of predation? *(GATE EE 2025)*

(A) Alarm calling

(B) Cannibalism

(C) Group living

(D) Sentinel behaviour

Q.18 Which of the following is NOT an example of an evolutionary arms race? *(GATE EE 2025)*

(A) Brood parasite and host interactions

(B) Conflict between parents and offspring

(C) Predator and prey interactions

(D) Recognition between kin

Q.19 The Weber-Fechner law states that the magnitude of a perceived sensation increases as $\log_{10}$ of stimulus intensity. Let us assume a background stimulus level of 1 unit, which increases to 10 units in situation P and to 100 units in situation Q. The perceived sensation in situation Q is stronger than the sensation perceived in situation P by a factor of _____. *(GATE EE 2025)*

Q.20 Monotremes are unique among mammals because they: *(GATE EE 2025)*

(A) have claws

(B) lay eggs

(C) possess hair

(D) produce milk

Q.21 The most important reason for a neuron to be myelinated is to: *(GATE EE 2025)*

(A) decrease the possibility of excitation from nearby muscle activity

(B) increase the diameter of the axon to slow down the action potential

(C) increase the speed of an action potential

(D) protect the nerve from physical damage

Q.22 A small isolated population is more likely to undergo speciation than a large population because, compared to the large population, the small population: *(GATE EE 2025)*

(A) has greater genetic diversity

(B) has a higher mutation rate

(C) is more affected by genetic drift

(D) is more susceptible to gene flow

Q.23 To which of the following families do the important timber species, sal and teak, belong? *(GATE EE 2025)*

(i) Dipterocarpaceae; (ii) Poaceae; (iii) Solanaceae; (iv) Verbenaceae

(A) i and ii
(B) i and iv
(C) ii and iii
(D) iii only

Q.24 The yields of which of these crops are most likely to be reduced by ongoing declines in bee populations? *(GATE EE 2025)*

(A) coffee
(B) rice
(C) tea
(D) wheat

Q.25 Dichlorodiphenyltrichloroethane is related to the phenomenon of: *(GATE EE 2025)*

(A) biomagnification in food webs
(B) coral bleaching in oceans
(C) the greenhouse effect
(D) ozone layer depletion

Q. 26 – Q. 55 carry two marks each.

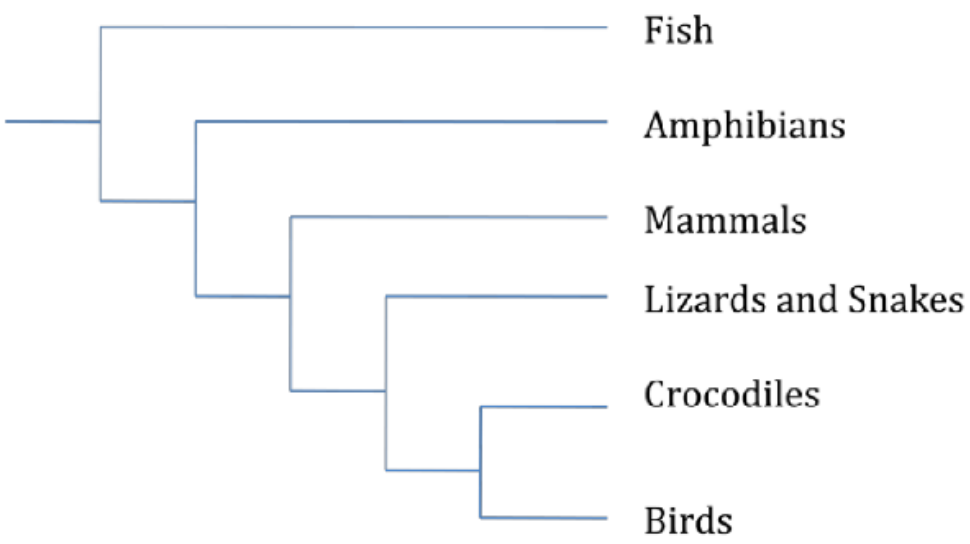
Q.26 Here is a data set on wing lengths in cm: 8, 9, 10, 10, 12, 13, 13, 14, 15, 15, 15, 19, 22, 25, 25. For this sample data set, the mean, median and mode are _____, _____, and _____ respectively. *(GATE EE 2025)*

(A) 15, 8 and 25
(B) 15, 14 and 8
(C) 15, 14 and 15
(D) 15, 15 and 15

Q.27 Dragonflies eat plant pollinators. Fish eat dragonfly larvae. A study compared the fitness of plants growing near ponds with and without fish. Given the above set of trophic interactions in a community, this study will likely find that: *(GATE EE 2025)*

(A) the fitness of plants is not affected by dragonflies
(B) the fitness of plants is not affected by whether ponds have fish
(C) plants growing near ponds without fish have higher fitness
(D) plants growing near ponds with fish have higher fitness

Q.28 Which of the following statements CANNOT be inferred from the following phylogenetic tree? *(GATE EE 2025)*



(A) Crocodiles are more closely related to birds than to the other reptiles
(B) Fish, lizards and snakes have a common ancestor
(C) Mammals and reptiles have evolved from amphibians
(D) Mammals are more closely related to crocodiles than to amphibians

Q.29 Assume that the abundance of a species in a community is proportional to the size of its niche. As each new species colonises this community, an existing niche is split. The resultant relative abundances of species in this community will be most uneven if: *(GATE EE 2025)*

(A) The largest niche is always split when a new species colonises

(B) The niches are split at random, independent of their size

(C) The probability of a niche being split is proportional to its size

(D) The smallest niche is always split when a new species colonises

Q.30 To study colour preference in bees, a student uses artificial flowers with a sugar reward. She gives bees a choice between blue round flowers and yellow square flowers of the same size. She finds that bees choose the blue flowers significantly more often than the yellow flowers and concludes that bees have a colour preference for blue flowers. However, her friend disagrees and suggests that she should have done the experiment differently. Which of the following would have been more appropriate to test for colour preference in bees? *(GATE EE 2025)*

(A) choice between blue round and blue square flowers

(B) choice between blue round and yellow round flowers

(C) choice between yellow round and blue square flowers

(D) choice between yellow round and yellow square flowers

Q.31 Which of the following does NOT form a component of phytohormone action? *(GATE EE 2025)*

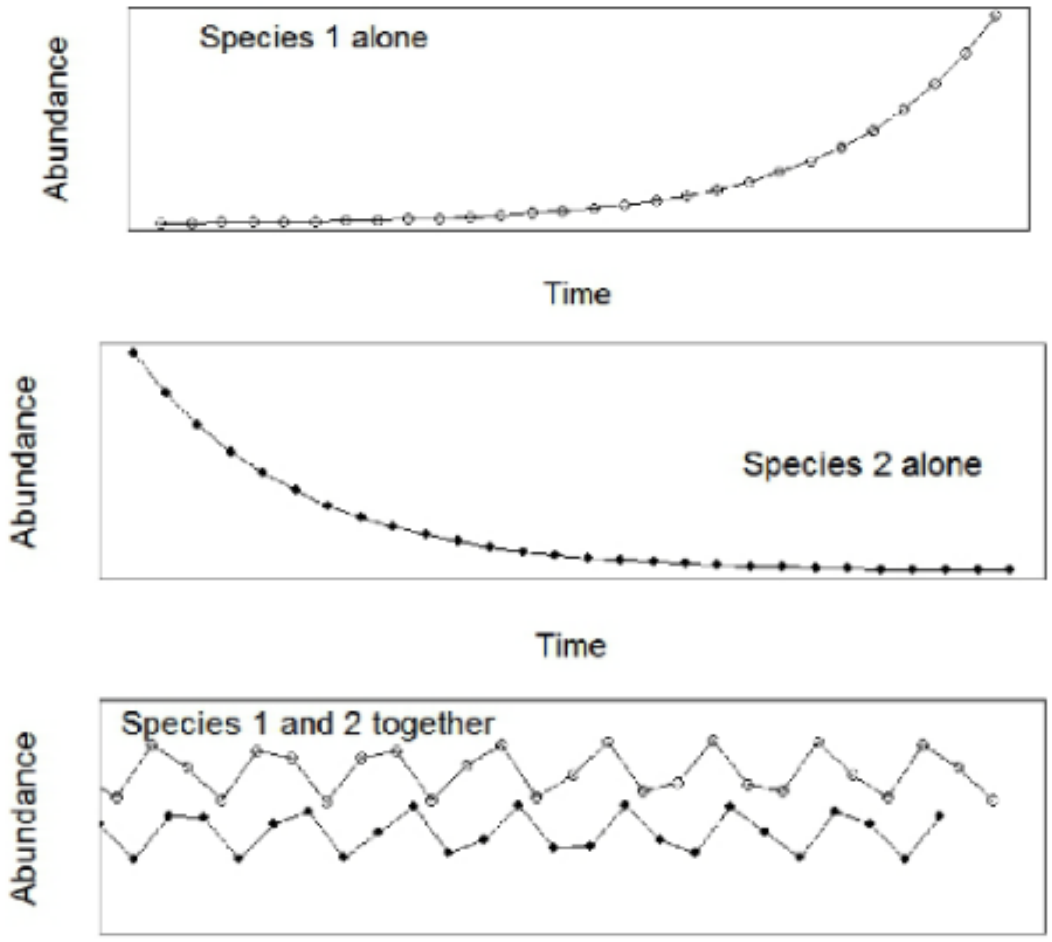
(A) recognition of specific proteins

(B) regulation of gene activity

(C) splitting of water molecules

(D) signal transduction across the cell

Q.32 The following three panels show the change in population size over time for two species when they are found alone and when they are found together. Which kind of interaction best describes the relationship between the two species? *(GATE EE 2025)*



(A) Amensalism
(B) Competition
(C) Mutualism
(D) Predation

Q.33 Fresh water fish belonging to the family Galaxoidae are found exclusively in the southern parts of the continents of South America, Africa and Australia. This pattern is explained by the theory proposed by: *(GATE EE 2025)*

(A) Alfred Russel Wallace
(B) Alfred Wegener
(C) Charles Darwin
(D) Charles Lyell

Q.34 Ant species X preys upon ant species Y. A researcher has the following set of observations regarding the behaviour of species X where aggression signifies a predatory response.

Stimulus	Reaction of Species X individuals
Glass bead coated with surface chemicals extracted from Species Y	Aggression
Washed glass bead	No reaction
Freshly immobilised Species Y individual	Aggression
Freshly immobilised Species Y individual with surface chemicals removed	Aggression

Table 1: Stimulus and reaction of Species X.

Which of the following statement(s) are correct regarding the behaviour of Species X? *(GATE EE 2025)*

(A) i, ii
(B) ii, iv
(C) i, iii
(D) iii, iv

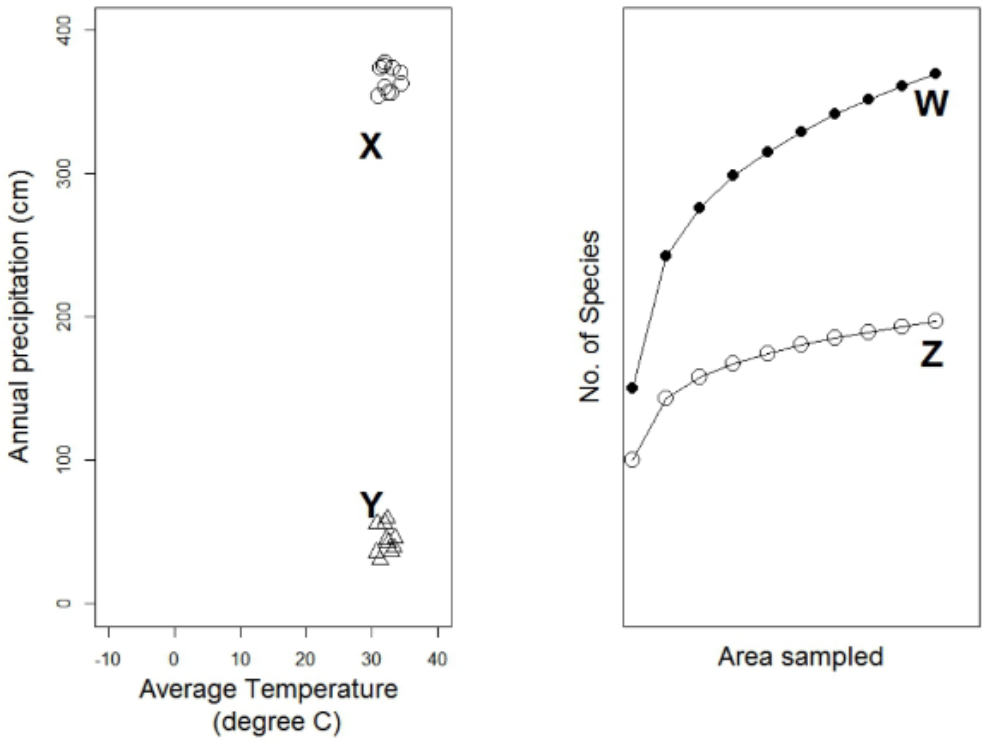
Q.35 In the schematic below, the left panel represents climatic zones occupied by two different biomes, X and Y, along gradients of temperature and precipitation. The right panel depicts the expected species-area relationships of these two biomes. From the figures below, which of the following are most likely to be true? *(GATE EE 2025)*

(A) i and ii
(B) i and iv
(C) ii and iii
(D) iii and iv

Q.36 In many plant and animal communities found on islands, the number of species (S) changes with the area (A) of the island as follows: $S = cA^z$, where $0 < z < 1$ and $c > 0$. Which graph best represents such species-area relationship? *(GATE EE 2025)*

Q.37 Males in a population differ in time spent displaying to females. A researcher hypothesizes predators cause these differences: males display longer in absence of predators and shorter when predators nearby. Which study design is most appropriate? *(GATE EE 2025)*

(i) Biome X will show pattern W
(ii) Biome Y will show pattern Z
(iii) Biome X will show pattern Z
(iv) Biome Y will show pattern W



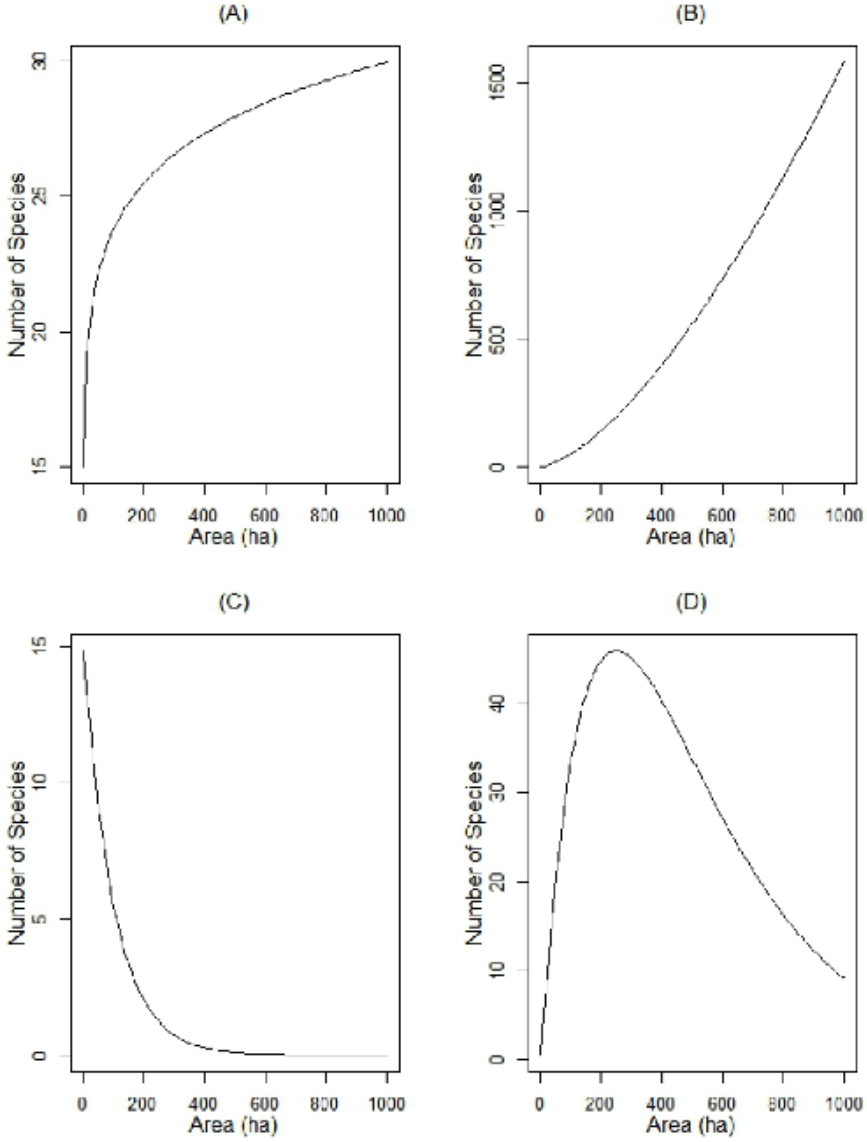
(A) Map predator distribution and female abundance; quantify male display variation without predators.
(B) Measure display rates, remove predators, measure again, repeat across populations.
(C) Measure display rates in areas with/without predators; capture males, switch areas, measure display.
(D) Measure display rates in areas with/without predators; manipulate female presence, measure display.

Q.38 In Batesian mimicry, a harmless species mimics a harmful or toxic model species. Increasing relative abundance of the mimic will: *(GATE EE 2025)*

(A) negatively affect both model and mimic populations
(B) negatively affect the model but not the mimic population
(C) positively affect both model and mimic populations
(D) positively affect the mimic but not the model population

Q.39 There are two alleles at a locus in a population in Hardy-Weinberg equilibrium. If proportion of dominant phenotype is 0.99, what proportion of the population is heterozygous? *(GATE EE 2025)*

Q.40 Haemophilia is a sex-linked recessive trait causing bleeding disorders. In a family with three children, the two sons have haemophilia, parents normal. Probability daughter inherited gene? And probability afflicted? *(GATE EE 2025)*

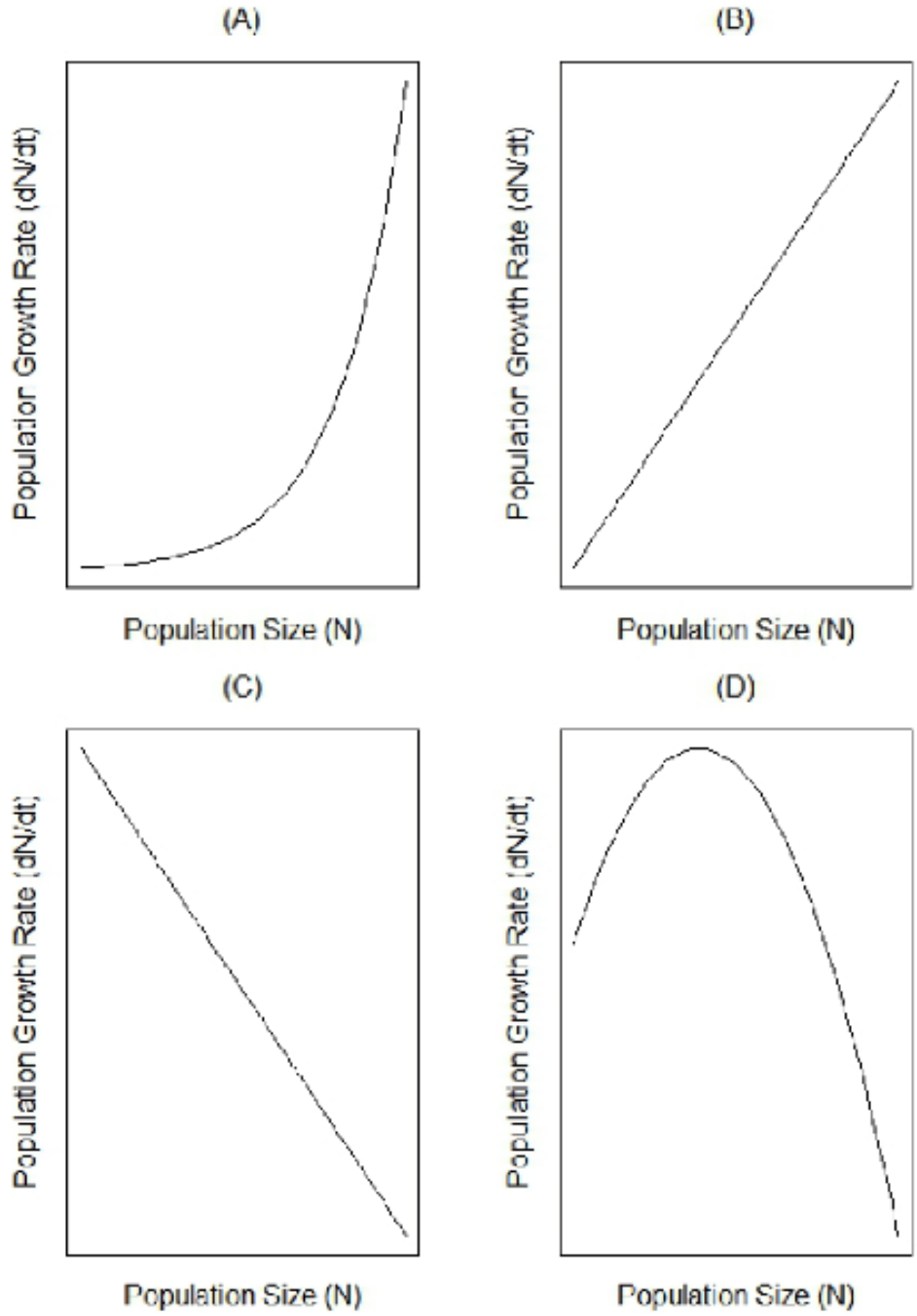


(A) $\frac{1}{2}$, 0
(B) $\frac{1}{2}$, 1
(C) $\frac{1}{2}$, $\frac{1}{4}$
(D) $\frac{1}{4}$, 0

Q.41 Which of the graphs below represents the relationship between population size (N) and population growth rate (dN/dt) for a population showing exponential growth? *(GATE EE 2025)*

Q.42 Two islands, P and Q, are similar in habitat and other features. They are 100 and 200 km^2 in size respectively, but have the same number of species. Which of the following statements can independently explain this observation? *(GATE EE 2025)*

(A) P is closer to the mainland than Q and P has lower speciation rates
(B) P is closer to the mainland than Q and P has higher speciation rates



(C) P is further away from the mainland than Q and P has higher speciation rates

(D) P is further away from the mainland than Q and P has lower speciation rates

Q.43 In reverse sexual selection, variance in mating success is higher in females than in males. In such species, which of the following is most expected? *(GATE EE 2025)*

(A) Females are the competing sex and males are the choosy sex

(B) Males are the competing sex and females are the choosy sex

(C) Mating is random and both sexes are not choosy

(D) Mating is non-random and both sexes are equally choosy

Q.44 According to the Hamilton-Zuk hypothesis, females prefer males with the most elaborate ornaments because those ornaments signal parasite resistance. Which of the following is NOT an assumption of this hypothesis? *(GATE EE 2025)*

(A) Parasites reduce male fitness
(B) Parasite resistance is indicated by male ornamentation
(C) Parasite resistance is genetic
(D) Parasite load is positively correlated with male ornamentation

Q.45 A plant produces flowers that are open through the day and the night. An experimenter places pollen on the stigmas of freshly opened flowers and covers them after pollination to prevent natural pollinators from having access to the flowers. When experimental pollination was carried out during the day, 40% of the flowers yielded fruit. When experimental pollination was carried out during the night, 80% of the flowers yielded fruit. However, when flowers were kept open to natural pollination during the day (covered at night), 35% of flowers produced fruit. 20% of flowers exposed to natural pollination during the night (covered during the day) produced fruit. Which of the following statements is NOT a plausible explanation of these results? *(GATE EE 2025)*

(A) night pollinators are low in abundance
(B) night pollinators are abundant
(C) night pollinators are low in pollination efficiency
(D) pollinators are active during the day

Q.46 Sex is determined by temperature in many reptiles, including crocodiles and turtles. While lower temperatures produce males in turtles, the pattern is the opposite in crocodiles. Due to climate change, there is an increase in temperatures which results in a change in sex ratios. In small populations, this change in demography is likely to negatively impact the population growth of: *(GATE EE 2025)*

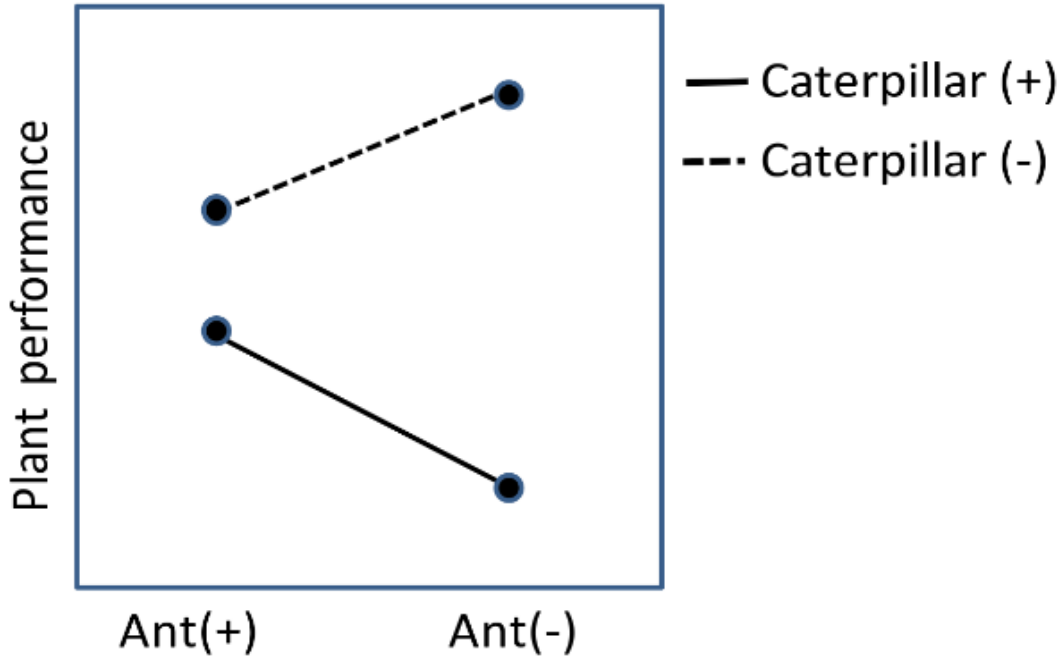
(A) crocodiles more than turtles
(B) neither of the two species
(C) both species equally
(D) turtles more than crocodiles

Q.47 An unbiased coin is tossed four times. What is the probability of getting at least three "heads" in a row? *(GATE EE 2025)*

Q.48 In a study of interactions between plants, ants and caterpillars, the following experimental treatments were imposed: i) Control (both ants and caterpillars are present); ii) Ant removal; iii) Caterpillar removal; iv) Ant and caterpillar removal. Plus (+) indicates presence and minus (-) indicates absence on plants. The results for plant performance (growth) from this experiment are shown in the figure below. Plant performance in all treatments were significantly different from each other. Based on these results, which of the following inferences is correct? *(GATE EE 2025)*

(A) In the absence of caterpillars, ants negatively affected plant performance
(B) In the absence of ants, caterpillars positively affected plant performance
(C) In the presence of caterpillars, ants negatively affected plant performance
(D) In the presence of ants, caterpillars positively affected plant performance

Q.49 Both males and females of a fish species show variation in colour. A population of this species consists of 40% blue females, 20% red females, 20% blue males and 20% red males. A researcher



catches one fish at random from this population. Given that a male fish is caught, the probability that it is blue is *(GATE EE 2025)* _____.

Q.50 Assume that an asexually propagating fungus has three colors of colonies, white, black and red. Such variability in color may have originated due to: *(GATE EE 2025)*

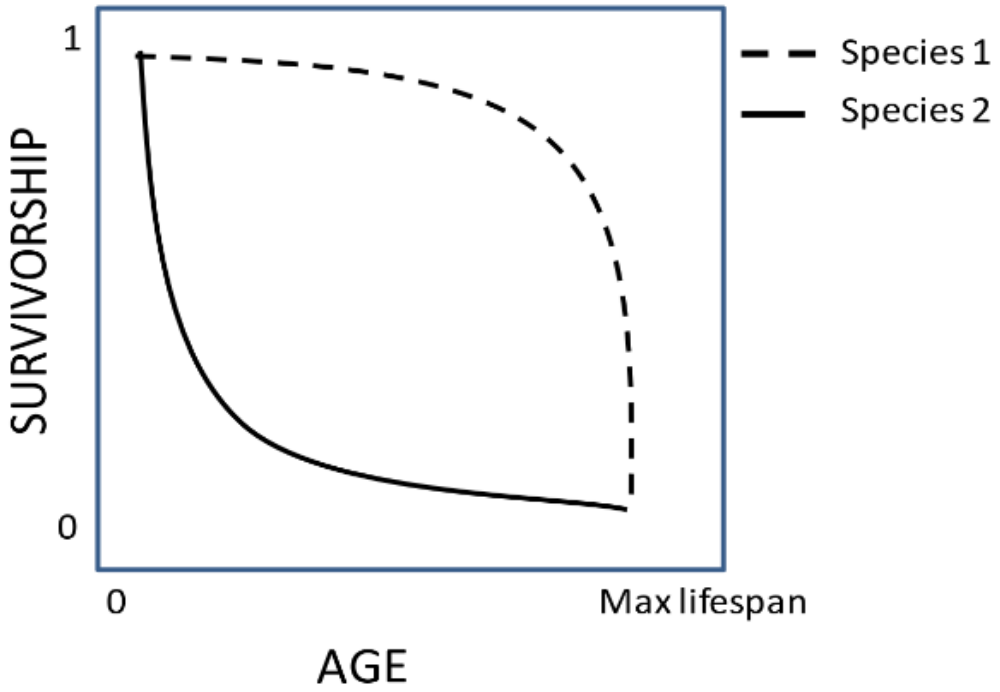
(A) germline mutation
(B) heterokaryosis
(C) genetic linkage
(D) sexual cross-over

Q.51 Shannon's index of diversity is calculated using the equation below, where p_i is the proportion of the i^{th} species and ln is natural logarithm. For a community with a given number of species, which of the following statements is true? *(GATE EE 2025)*

(A) Shannon's index will be highest if all species have equal abundance
(B) Shannon's index will be highest if one species is highly dominant
(C) Shannon's index will be highest if there are many rare species
(D) The relative abundance is irrelevant to Shannon's index

Q.52 The schematic below shows the relationship between survivorship with age (relative to maximum lifespan) in Species 1 (dashed line) and Species 2 (solid line). Which of the following inferences is compatible with this figure? *(GATE EE 2025)*

Q.53 A team of conservation biologists, surveying a population of frogs on an island, captured and marked 312 individuals in the first sample. In a second sampling, 3 days later, the team caught 140 individuals of which 26 were previously marked. The total number of frogs on the island is estimated to be _____. *(GATE EE 2025)*



Q.54 The following equation represents a hypothetical relationship between fitness (w) and shoot:root ratio (r) in individuals of a plant species: $w = 10r - 10r^2$. At what value of shoot:root ratio (r), do these plants achieve maximum fitness? *(GATE EE 2025)* _____

Q.55 The relative abundance of C3 relative to C4 plant species increases with latitude because of the associated temperature gradient. A study in North America found that at 42° North, C3 plants become more abundant than C4 plants. Given an increase in mean global temperatures by 10°C and no other changes in environmental conditions, the latitude at which C3 plants become more abundant: *(GATE EE 2025)*

(A) will move Northwards towards the polar region

(B) will move Southwards towards the equator

(C) will move South of the equator

(D) will not change in response to temperature

END OF QUESTION PAPER

Q. No	Type	Section	Key	Marks
1	MCQ	GA	C	1
2	MCQ	GA	A	1
3	MCQ	GA	A	1
4	MCQ	GA	A	1
5	MCQ	GA	D	1
6	MCQ	GA	D	**2**
7	MCQ	GA	B	2
8	MCQ	GA	C	2
9	MCQ	GA	B	2
10	MCQ	GA	C	2
11	MCQ	EY	D	1
12	MCQ	EY	D	1
13	MCQ	EY	A; D	1
14	MCQ	EY	B	1
15	NAT	EY	7.99 : 8.10	1
16	MCQ	EY	B	1
17	MCQ	EY	C	1
18	MCQ	EY	D	1
19	NAT	EY	9.9 : 10.1	1
20	MCQ	EY	C	1
21	MCQ	EY	B	1
22	MCQ	EY	A	1
23	MCQ	EY	D	1
24	MCQ	EY	B	1
25	MCQ	EY	A	1
26	MCQ	EY	C	2
27	MCQ	EY	D	2
28	MCQ	EY	C	2
29	MCQ	EY	D	2
30	MCQ	EY	B	2
31	MCQ	EY	A	2
32	MCQ	EY	C	2
33	MCQ	EY	A	2
34	MCQ	EY	B	2
35	MCQ	EY	A	2
36	MCQ	EY	A	2
37	MCQ	EY	C	2
38	MCQ	EY	A	2
39	NAT	EY	0.17 : 0.19	2
40	MCQ	EY	A	2
41	MCQ	EY	B	2
42	MCQ	EY	B	2
43	MCQ	EY	A	2
44	MCQ	EY	D	2
45	MCQ	EY	B	2
46	MCQ	EY	A	2
47	NAT	EY	0.175 : 0.20	2
48	MCQ	EY	A	2
49	NAT	EY	0.49 : 0.51	2
50	MCQ	EY	B	2
51	MCQ	EY	A	2
52	MCQ	EY	C	2
53	NAT	EY	1660 : 1700	2
54	NAT	EY	0.45 : 0.55	2
55	MCQ	EY	A	2

Table 2: GATE 2016 EY Answer Key Summary