DEC-2020

1. Two populations of squirrels evolved across two regions separated by a large geographic barrier. Over a long period of time these populations are reproductively and geographically isolated from each other. This is an example of
    a. sympatric speciation
    b. allopatric speciation
    c. artificial speciation
    d. anagenesis

2. Which one of the following statements is correct with reference to ecotones?
    a. Ecotones are rich in endemic species and only contain species not found in surrounding ecosystems.
    b. Ecotones refer to areas that are under habitat degradation and contain endangered species that are not found in the neighboring communities.
    c. Ecotones are species poor habitats due to scarcity of soil nutrients and availability of resources.
    d. Ecotones are transition areas between two ecosystems and have greater number of species than either of the neighboring communities.

3. A researcher has treated pea leaves with pchloromercuribenzenesulfonic acid {PCMBS), which inactivates plasma membrane transporters. It was observed that phloem loading of sucrose is inhibited. Which one of the following interpretations is correct?
    a. Simplistic loading is eliminated
    b. Apoplastic loading is eliminated
    c. Both simplistic and apoplastic loadings are eliminated
    d. Photosynthesis rate is reduced.

4. Given below are the possible reasons of high probability for extinction of species:
    A. Increased homozygosity of alleles
    B. Increased heterozygosity of alleles
    C. Decreasing population sizes
    D. Increasing demographic stochasticity
    E. Decreasing environmental stochasticity

    Which one of the following options represents the correct combination of reasons that can lead to the highest probability of extinction of species?
    a. (ii), (iii) and (v)
    b. (i), (iii) and (iv)
    c. (i), (ii) and (iii)
    d. (ii), (iii) and (vi)

5. Felsenstein zone in a phylogenetic tree refers to a region of tree space where,
    a. maximum likelihood would be inconsistent

b. lineages converge due to shared common ancestry
c. outgroups relationship is influential
d. maximum parsimony would be inconsistent

6. According to the classical Lotka-Volterra competitionmodel, which of the following conditions allow for co-existence of two competing species
   a. both species are equally capable of inhibiting each other
   b. intraspecific competition of each species > interspecific competition
   c. intraspecific competition < interspecific competition
   d. there is no intraspecific competition in either specie

7. Co-existence of several species of birds in an area is possible under the following conditions
   a. High niche overlap and high niche differentiation
   b. Low niche overlap and high niche differentiation
   c. High niche overlap and low niche differentiation
   d. Low niche overlap and low niche differentiation

8. Afield biologist is sampling tree species in a forest area to estimate tree diversity. What method can be employed to decide if his sampling effort is adequate to estimate the tree diversity in the area?
   a. Quadrat method of sampling
   b. Saturation using species accumulation curves
   c. Frequency distributions
   d. Jaccard's dissimilarity coefficient

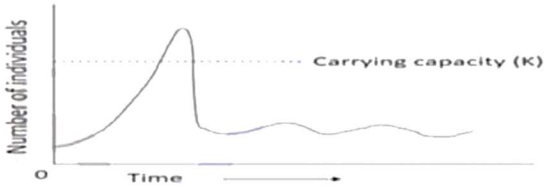
9. In a population showing exponential growth, per capita growth rate will:
   a. decrease as population size increases
   b. increase as population size increases
   c. remain constant as population size increases
   d. increase initially and then saturate at large population sizes

10. The following statements describe the outcomes of genetic drift:
    A. Genetic drift can eliminate alleles.
    B. Genetic drift can be associated with population bottleneck.
    C. Genetic drift is not observed in populations that increase in size, once they grow through a bottleneck.
    D. Genetic drift can be associated with founder effect.

    Which one of the following combinations represents all correct statements?
    a. A, Band C
    b. B, C and D
    c. A, Band D
    d. A, C and D

11. Examples of antibiotic resistance highlight important features of natural selection. Which of the following statements is NOT true?
    a. Evolution by natural selection is progressive, it makes individuals 'better'.
    b. Natural selection acts on individuals but it is populations that change with time.
    c. Natural selection does not cause genetic changes in individuals
    d. Natural selection acts on phenotype

12. A population of crickets invading a new grassland showed a population growth pattern as shown in the figure



Following is the list of potential interpretations:
A. Environment is damaged due to population overshooting its K
B. The resources did not recover and population dies out
C. Carrying capacity is lowered due to shift in environmental conditions.

Which one of the following options/combination of options can correctly explain the cricket growth pattern?
    a. A only
    b. B only
    c. A and Conly
    d. B and Conly

13. Given below are namesof scientists and phrases describing their work, which may or may not be matched

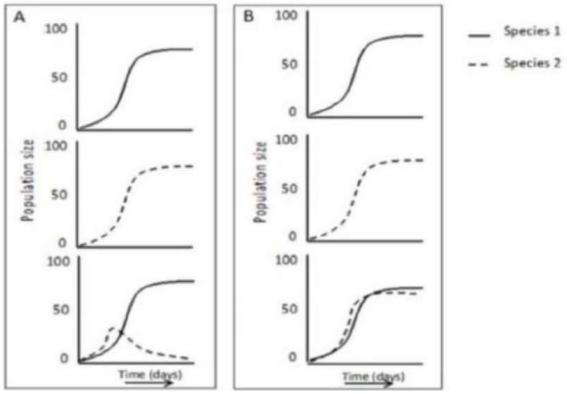
Name of Scientist		Work	
i	Wallace	A.	Inheritance of acquired characters
ii	Lyell	B.	Natural selection is differential survival or reproduction
iii	Lamark	C.	Processes that alter the earth are uniform through time
iv	Cuvier	D.	Earth's geology and natural history have been shaped by periods of catastrophic extinction and new creations
		E.	Ontogeny recapitulates phylogeny

Which one of the following options represents correct matches between the scientist and his/her work?
    a. i-A; ii-B; iii-C; iv-E
    b. i-B; ii-C; iii-A; iv-D
    c. i-A; ii-C; iii-E; iv-B
    d. i-E; ii-D; iii-A; iv-C

14. In a population that is in a Hardy-Weinberg equilibrium, 40% of the plants are recessive homozygotes and produce white flowers (WF). If the total number of individuals in the population is 14000 plants, the numbers of homozygous dominant red flowered (RF) plants and heterozygous pink flowered(PF) plants would be:
    a. RF-5600 PF-1891
    b. RF-1891 PF-6508
    c. RF-5600 PF-6508
    d. RF-5145 PF-8855

15. You wanted to conduct the Miller-Urey experiment and used a simplified apparatus with Tungsten electrodes. Heated the glassware at 5oooc for 3 hours to remove any organic contaminants. Gases NH3, CH4, CO and H2 were introduced followed by generating electric spark. Which of the essential ingredients did you forget to add?
    a. O2
    b. H2O
    c. HCN
    d. CHO

16. Growth patterns of two species (grown alone or together) are shown in Figures A and B



    a. A- mutualism, B- commensalism
    b. A- competition, B- parasitism
    c. A- commensalism, B- mutualism
    d. A- competition, B- resource partitioning