

八十五學年度 生命科學 系(所) 分生組甲.乙 生醫組甲.乙 組碩士班研究生入學考試

科目 生物學 科號 0902、1003、1202、1303 共 7 頁第 1 頁 *請在試卷【答案卷】內作答

First Part (60%)

Choose the best answer to each question. Write the letter for that answer to the left of the question number.

1. All of the following statements about the biogeographical aspects of diversity are correct EXCEPT
 - a) The patterns of continental drift are important considerations in the study of the past and present distributions of species
 - b) The magnitude of photosynthesis is the factor that accounts for the major clines in species diversity over Earth's large areas
 - c) Species richness on an island is set at an equilibrium point where immigration equals extinction
 - d) A species may be limited to a particular range because it never dispersed beyond the range or it dispersed but failed to survive in other locations
 - e) Island biogeographical theory applies to the relatively short period of time when colonization is the important process determining species composition; over a longer time, actual speciation affects the composition

2. A species that is relatively r-selected might have all of the following characteristics EXCEPT
 - a) lives in a disturbed area
 - b) small offspring
 - c) parental care of offspring
 - d) numerous offspring
 - e) little homeostatic capability

3. All of the following are important factors in the development of terrestrial biomes EXCEPT
 - a) the species of colonizing animals
 - b) prevailing temperature
 - c) prevailing rainfall
 - d) mineral nutrient availability
 - e) soil structure

4. All of the following are correct statements about the vertebrate eye EXCEPT
 - a) The vitreous humor regulates the amount of light entering the pupil
 - b) The transparent cornea is an extension of the sclera
 - c) The fovea is the center of the visual field and contains only cones
 - d) The ciliary muscle functions in accommodation
 - e) The retina lies just inside the choroid and contains the photoreceptor cells

八十五學年度 生命科學

系(所) 分生組甲、乙
生醫組甲、乙 組碩士班研究生入學考試

科目 生物學

科號 0902、1003
1202、1303 共 7 頁第 2 頁 *請在試卷【答案卷】內作答

5. Which of the following is a correct statement about a resting neuron
- It is releasing lots of acetylcholine
 - The membrane is very leaky to sodium
 - The membrane is equally permeable to sodium and potassium
 - The membrane potential is more negative than the threshold potential
 - The concentration of sodium is greater inside the cell than outside
6. All of the following are true concerning homeotic genes EXCEPT
- they are the primary inducer of frog morphogenesis
 - a DNA sequence of 180 nucleotides is common to all of the genes
 - they are translated into peptide sequences called homeodomains
 - the peptide gene product is a regulatory protein that controls transcription
 - a mutation may cause misplacement of body segments
7. Inhibition of the release of GnRH from the hypothalamus will
- stimulate production of estrogen and progesterone
 - initiate ovulation
 - inhibit secretion of gonadotropins from the pituitary
 - stimulate secretion of LH and FSH
 - initiate the flow phase of the menstrual cycle
8. The advantage of excreting wastes as urea rather than ammonia is
- urea is less toxic than ammonia
 - urea requires less water for excretion than ammonia
 - urea does not affect the osmolar gradient
 - urea can be exchanged for Na^+
 - Both a and b are advantages
9. Oxytocin and ADH are produced by the
- hypothalamus and stored in the neurohypophysis
 - adenohypophysis and stored in the kidneys
 - thymus and stored in the thyroid
 - adrenal cortex
 - gonads

八十五學年度 生命科學 系(所) 分生組甲、乙 生醫組甲、乙 組碩士班研究生入學考試

科目 生物學 科號 ^{0902, 1003}_{1202, 1303} 共 7 頁第 3 頁 *請在試卷【答案卷】內作答

10. When a physician discovers a strep infection, he or she may begin immediate treatment with antibiotics. The primary reason for this immediate use of antibiotics is to
- boost the formation of antibodies to the strep bacteria
 - control the strep bacteria while antibodies are being produced
 - destroy the strep bacteria before antibodies can be formed
 - prevent the proliferation of the strep bacteria
 - Both b and c are correct
11. What is the primary role of oxygen in respiration
- to yield energy in the form of ATP as it is passed down the respiratory chain
 - to act as an acceptor for electrons (hydrogen) forming water
 - to combine with carbon, forming CO_2
 - to combine with lactic acid to form pyruvic acid
 - to catalyze glycolysis reaction
12. Which of the following is a correct statement about trypsin, chymotrypsin, and carboxypeptidase
- They are manufactured by the liver
 - They are all forms of the enzyme lipase
 - They hydrolyze starch into disaccharides
 - They are denatured and rendered inactive by sucrase
 - They are activated by the action of enterokinase on zymogens
13. Which of the following is an example of positive feedback
- An increase in blood sugar concentration increases the amount of the hormone that stores sugar as glycogen
 - A decrease in blood sugar concentration increases the amount of the hormone that converts glycogen to glucose
 - An infant's suckling at the mother's breast increases the amount of the hormone that induces the release of milk from the mammary glands
 - An increase in calcium concentration increases the amount of the hormone that stores calcium in bone
 - A decrease in calcium concentration increases the amount of the hormone that releases calcium from bone
14. The stimulation of rooting in stem cuttings and the rapid and lethal stem growth of broad-leaved dicot weeds can be accomplished by the use of a molecule which is a synthetic
- auxin
 - cytokinin
 - oligosaccharin
 - gibberellin
 - ethylene

八十五學年度 生命科學 系(所) 分生組甲、乙
生醫組甲、乙 組碩士班研究生入學考試

科目 生物學 科號 0902、1093
1202、1303 共 7 頁第 4 頁 *請在試卷【答案卷】內作答

15. All of the following are features responsible for the evolutionary success of angiosperms EXCEPT
- a triploid endosperm
 - an ovary that becomes a fruit
 - animal pollination
 - a reduced sporophyte phase
 - double fertilization
16. Which of the following best describes the general role of micronutrients in plants
- They are cofactors in enzyme reactions
 - They are necessary for essential regulatory functions
 - They prevent chlorosis
 - They are components of nucleic acids
 - They are necessary for the formation of cell walls
17. The opening of stomates is thought to involve
- an increase in the osmotic concentration of the guard cells
 - a decrease in the osmotic concentration of the stoma
 - active transport of water into the guard cells
 - decreased turgor pressure in guard cells
 - movement of K^+ out of guard cells
18. A student examining leaf cross sections under a microscope finds many loosely packed cells with relatively thin cell walls. The cells have numerous chloroplasts. What cells are these
- parenchyma
 - xylem
 - endodermis
 - collenchyma
 - sclerenchyma
19. Which of the following statements about mammalian evolution is correct
- Mammals evolved from reptilian stocks even earlier than birds
 - The first mammals were large predators like the saber-tooth tigers
 - Mammals were fortunate not to coexist with the dominant dinosaurs
 - The early mammals were most similar to small, bipedal, ratite birds
 - Mammals evolved from the thecodonts during the Pleistocene epoch

八十五學年度 生命科學

系(所)

分生組甲、乙

生醫組甲、乙

組碩士班研究生入學考試

科目 生物學

科號 0802、1803
1202、1303

共 7

頁第 5

頁

*請在試卷【答案卷】內作答

20. All of the following are characteristics of arthropods EXCEPT
- an exoskeleton
 - numerous species
 - jointed appendages
 - a diversity of gas exchange structures
 - a dorsal nerve cord
21. What do fungi and arthropods have in common
- Both groups are commonly coenocytic
 - The haploid state is dominant in both groups
 - Both groups are predominantly saprophytic in nutrition
 - Both groups use chitin for the construction of protective coats
 - Both groups have cell walls
22. In flowering plants, meiosis occurs specifically in the
- megaspore mother cells
 - microspore mother cells
 - endosperm
 - Only a and b are correct
 - a, b and c are correct
23. According to the endosymbiotic theory, the ancestors of mitochondria were probably
- aerobic eukaryotes
 - aerobic bacteria
 - anaerobic bacteria
 - cyanobacteria
 - chloroplasts
24. The antibiotics known as penicillins inhibit the ability of bacteria to
- form spores
 - perform respiration
 - replicate DNA
 - synthesize proteins
 - synthesize cell walls
25. The first genetic material was most likely
- a DNA polymer
 - a DNA oligonucleotide
 - an RNA polymer
 - a protein
 - a protein enzyme
26. Macroevolution includes all of the following EXCEPT
- mass extinctions
 - evolutionary novelties
 - speciation by divergence
 - the study of evolutionary trends
 - global episodes of major adaptive radiations

八十五學年度 生命科學 系(所) 分生組甲.乙
生醫組甲.乙 組碩士班研究生入學考試
科目 生物學 科號 0002:1003
1202:1303 共 7 頁第 6 頁 *請在試卷【答案卷】內作答

27. Although different species of warblers often migrate together and use the same habitats for mating and feeding, they rarely hybridize. The isolating mechanism most likely to be operating in
- ecological isolation
 - temporal isolation
 - behavioral isolation
 - mechanical isolation
 - genetic isolation
28. In a population with two alleles, A and a, the frequency of a is 0.6. What would be the frequency of heterozygotes if the population is in Hardy-Weinberg equilibrium
- 0.1
 - 0.3
 - 0.
 - 0.4
 - 0.6
29. Natural selection is based on all of the following EXCEPT
- Variation exists within populations
 - The fittest individuals leave the most offspring
 - There is differential reproductive success within populations
 - Populations tend to produce more individuals than the environment can support
 - the need for individuals to adapt to their environment
30. If you discovered a bacterial cell that contained no restriction endonuclease which of the following would you expect to happen
- The cell would be unable to replicate its DNA
 - The cell would create incomplete plasmids
 - The cell would be easily infected and lysed by bacteriophages
 - The cell would become an obligate parasite
 - Both a and d would occur

八十五學年度 生命科學 系(所) 分生組甲、乙
生醫組甲、乙 組碩士班研究生入學考試
科目 生物學 科號 0902、1003
1202、1303 共 7 頁第 7 頁 *請在試卷【答案卷】內作答

Second Part (40%, 10% for each question)

1. Name a species that shows r-selection(reproductive strategies) and one that shows K-selection, and explain the difference.
2. How can geneticists use RFLPs to predict whether a person has a certain defective gene?
3. What mechanism helps prevent errors in DNA replication?
4. Name two large lymphoid organs, and give the function of each.