

I. Single Choice Questions (60 %):

- ( ) 1. Which of the following is NOT a function of the Krebs cycle? A. production of ATP, B. production of NADH, C. production of FADH<sub>2</sub>, D. release of CO<sub>2</sub>, E. splitting the carbon skeletons of simple sugars.
- ( ) 2. Which of the following organisms does not reproduce cells by mitosis and cytokinesis? A. cow, B. bacterium, C. mushroom, D. cockroach, E. banana tree.
- ( ) 3. Enzymes that control the activities of other proteins are called A. ATPases, B. microtubules, C. kinetochores, D. chromatin, E. protein kinases.
- ( ) 4. In crossing a homozygous recessive with a heterozygote, what is the chance of getting a homozygous recessive phenotype in the F<sub>1</sub> generation? A. zero, B. 25%, C. 50%, D. 75%, E. 100%.
- ( ) 5. Which of the following is a possible phenotype for the father? A. A negative, B. O negative, C. B positive, D. A positive, E. O positive.
- ( ) 6. In a cross AaBbCc X AaBbCc, what is the probability of producing the genotype AABBCC? A. 1/4, B. 1/8, C. 1/16, D. 1/32, E. 1/64.
- ( ) 7. A man who carries an X-linked allele will pass it on to A. all of his daughters, B. half of his daughters, C. all of his sons, D. half of his sons, E. all of his children.
- ( ) 8. Which of the following is a sex-influenced trait? A. male-pattern baldness, B. white eyes in fruit flies, C. hemophilia, D. color blindness, E. Turner syndrome.
- ( ) 9. Which enzyme catalyzes the elongation of a DNA strand in the 5' → 3' direction? A. primase, B. DNA ligase, C. DNA polymerase, D. topoisomerase, E. helicase.
- ( ) 10. In prokaryotes, the primary transcript of structural genes is A. hnRNA, B. tRNA, C. rRNA, D. mRNA.
- ( ) 11. Reproduction in bacteria requires A. a mitotic spindle, B. a plasmid, C. cAMP, D. replication of DNA.
- ( ) 12. A eukaryotic gene typically has all of the following features EXCEPT A. introns, B. a promoter, C. an operator, D. a start base triplet, E. a transcriptional stop message.
- ( ) 13. In a nucleosome, what is the DNA wrapped around? A. polymerase molecules, B. ribosomes, C. mRNA, D. histones, E. nucleolus protein.
- ( ) 14. Restriction fragments of DNA are separated from one another by which process? A. filtering, B. centrifugation, C. gel electrophoresis, D. chromatography, E. electron microscopy.
- ( ) 15. Of the following anatomical structures, which is homologous to the wing of a bat? A. the dorsal fin of a shark, B. the tail of a kangaroo, C. the wing of a butterfly, D. tail fin of fish, E. arm of human.
- ( ) 16. Gene frequencies in a gene pool may shift randomly and by chance. There is called A. artificial selection, B. adaptive radiation, C. climatic shift, D. genetic drift, E. natural selection.
- ( ) 17. Which of the following is the unit of evolution? In other words, which of the following can evolve in the Darwinian sense? A. gene, B. chromosome, C. individual, D. population, E. species.
- ( ) 18. Natural selection tends to reduce variation in gene pools. Which process serves to balance natural selection by creating new alleles? A. meiosis, B. sex, C. mutation, D. migration, E. reproduction.
- ( ) 19. The biological species concept is inadequate for grouping A. plants, B. parasites, C. asexual organisms, D. endemic populations, E. sympatric populations.
- ( ) 20. Macroevolution includes the study of all of the following Except A. mass extinctions, B. evolutionary novelties, C. speciation, D. the study of evolutionary trends, E. global episodes of major adaptation.
- ( ) 21. Which of the following can be used to determine the absolute age of fossils? A. index fossils, B. the "DNA clock", C. cladistics, D. sedimentary strata, E. the half-life of isotopes.
- ( ) 22. The first genetic material was most likely A. a DNA polymer, B. a DNA oligonucleotide, C. an RNA polymer, D. a protein, E. a protein enzyme.
- ( ) 23. In their laboratory simulation of the early Earth, Miller and Urey observed the abiotic synthesis of A. amino acids, B. coacervates, C. DNA, D. liposomes, E. microspheres.
- ( ) 24. How many kingdoms were recognized by Linnaeus? A. one, B. two, C. three, D. four, E. five.
- ( ) 25. In an aerobic prokaryotic cell, the molecules of the respiratory chain are located in the A. cytosol, B. cristae, C. cell wall, D. plasma membrane, E. mitochondrial matrix.
- ( ) 26. The botulism toxin is an example of a(an) A. antibiotic, B. exotoxin, C. endotoxin, D. nitrogenase, E. opsin.
- ( ) 27. Which of the following is the dominant stage in the life cycle of a moss? A. sporophyte, B. gametophyte, C. diploid, D. sporangium, E. flowering stage.
- ( ) 28. Both Penicillium and Aspergillus produce asexual spores at the tips of the A. asci, B. antheridia, C. rhizoids, D. gametangia, E. conidiophores.
- ( ) 29. All of the following animal groups have evolved terrestrial life forms EXCEPT A. Mollusca, B. Crustacea, C. Echinodermata, D. Arthropoda, E. Vertebrata.
- ( ) 30. Among the invertebrates, arthropods are unique in possessing A. a notochord, B. ventral nerve cords, C. open circulation, D. jointed appendages, E. segmented bodies.
- ( ) 31. Which of the following is characteristic of all chordates? A. a jointed endoskeleton, B. gills, C. a ventral nerve cord, D. a notochord, E. two pairs of appendages.
- ( ) 32. The amniote egg first evolved in which of the following groups? A. fish, B. birds, C. reptiles, D. amphibians, E. egg-laying mammals (monotremes).
- ( ) 33. What does primary phloem in the root develop from? A. protoderm, B. endoderm, C. procambium, D. ground tissue, E. vascular cambium.
- ( ) 34. All of the following normally enter the plant through the roots EXCEPT A. carbon dioxide, B. water, C. nitrogen, D. potassium, E. calcium.
- ( ) 35. Which of the following is the major role of potassium in plants? A. osmotic regulation, B. ATP synthesis, C. photosynthesis, D. reproduction, E. lipid metabolism.
- ( ) 36. The fibroblasts secrete A. fats, B. chondrin, C. interstitial fluids, D. calcium phosphate for bone, E. proteins for connective fibers.
- ( ) 37. Which of these animals has gastrovascular cavity? A. bird, B. hydra, C. mammal, D. insect, E. annelid.
- ( ) 38. Which of the following would have the lowest metabolic rate (mm O<sub>2</sub>/g/hr)? A. cows, B. owls, C.

- frogs, D. humans, E. pigeons.
- ( ) 39. Blood sugar concentration is likely to vary most in which of these blood vessels? A. the abdominal artery, B. the coronary arteries, C. the pulmonary veins, D. hepatic portal vein, E. the hepatic vein.
- ( ) 40. The process of intracellular digestion is usually preceded by A. hydrolysis, B. endocytosis, C. absorption, D. elimination, E. secretion.
- ( ) 41. In which animal does blood flow from the respiratory organ to the heart before circulating through the rest of the body? A. annelid, B. mollusk, C. fish, D. frog, E. insect.
- ( ) 42. Which one of the following animals would have the highest heart rate? A. rat, B. cat, C. horse, D. human.
- ( ) 43. Tracheal systems for gas exchange are found in A. crustaceans, B. earthworms, C. insects, D. jellyfish.
- ( ) 44. A person suffering from AIDS would be unlikely to suffer from which of the following diseases? A. cancer, B. rheumatoid arthritis, C. hepatitis, D. tuberculosis, E. influenza.
- ( ) 45. Cell-mediated immunity is mostly the function of A. T cells, B. B cells, C. erythrocytes, D. complement cells, E. cytotoxic cells.
- ( ) 46. Which of the following cell types is responsible for initiating a secondary immune response? A. memory cells, B. macrophages, C. stem cells, D. B cells, E. T cells.
- ( ) 47. The main nitrogenous waste excreted by birds is A. ammonia, B. nitrate, C. nitrite, D. urea, E. uric acid.
- ( ) 48. Organisms categorized as osmoconformers are most likely A. terrestrial, B. marine, C. amphibious, D. found in freshwater streams, E. found in freshwater lakes.
- ( ) 49. Which hormone exerts antagonistic action to PTH (parathyroid hormone)? A. thyroxin, B. epinephrine, C. growth hormone, D. calcitonin, E. glucagon.
- ( ) 50. Which of the following endocrine structures is (are) NOT controlled by a tropic hormone from the anterior pituitary? A. pancreatic islet cells, B. thyroid gland, C. adrenal cortex, D. ovaries, E. testes.

II. Matching questions (Each term may be used once, more than once, or not at all)  
(match each statement in left-hand column with special term in right-hand column) (40%)

- ( ) 51. Caused by increasing concentration of CO<sub>2</sub>. A. Gaia hypothesis
- ( ) 52. Caused by excessive nutrient input into lakes. B. turnover
- ( ) 53. Caused by excessive levels of DDT in fish-eating birds. C. biomagnification
- ( ) 54. Occurs at a high rate for nutrients in tropical rain forests. D. greenhouse effect
- ( ) 55. Occurs at a high rate for phytoplankton in the English Channel. E. cultural eutrophication
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- ( ) 56. Produces hormones which are secreted by the pituitary gland. A. cerebrum
- ( ) 57. Coordinates muscle actions. B. cerebellum
- ( ) 58. Regulates body temperature. C. thalamus
- ( ) 59. Contains regulatory centers for the respiratory & circulatory systems. D. hypothalamus
- ( ) 60. Contains regions that help regulate hunger and thirst. E. medulla oblongata
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- ( ) 61. Secreted by the interstitial cells of the testes. A. HCG
- ( ) 62. Participates in the regulation of labor contractions. B. progesterone
- ( ) 63. Initiates the growth of the placenta and enlargement of the uterus. C. oxytocin
- ( ) 64. The secretion of LH from pituitary is inhibited by a high concentration of this hormone. D. prolactin
- ( ) 65. Required so that the corpus luteum can function through the first and part of the second trimesters of pregnancy. E. progesterone
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- ( ) 66. Secreted by the pancreas. A. ecdysone
- ( ) 67. Signals the liver to produce somatomedins. B. glucagon
- ( ) 68. Stimulates the contraction of uterine muscle. C. thyroxin
- ( ) 69. Secreted by the anterior lobe of the pituitary. D. oxytocin
- ( ) 70. Steroid hormone that triggers molting in arthropods. E. growth hormone
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- ( ) 71. Form plasma cells that give rise to antibodies. A. cytotoxic T cells
- ( ) 72. Release cytokines, which activate B cells. B. delayed sensitivity T cells
- ( ) 73. Release perforin, which causes target cells to lose their cytoplasm. C. helper T cells
- ( ) 74. Cooperate with macrophages to enable the production of antibodies. D. suppressor T cells
- ( ) 75. Attack & destroy intracellular pathogens such as the tuberculin bacillus. E. B cells.
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- ( ) 76. High blood pressure. A. atherosclerosis
- ( ) 77. An inherited defect in the clotting process. B. arteriosclerosis
- ( ) 78. Defect in one or more of the valves of the heart. C. hypertension
- ( ) 79. Calcification of plaques lining the inner walls of arteries. D. heart murmur
- ( ) 80. Plaque formation by infiltration of lipids into arterial smooth muscles. E. hemophilia
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- ( ) 81. Inhibits growth, closes stomata during water stress. A. auxin
- ( ) 82. Stimulates cell division by influencing the synthesis or activation of proteins required for mitosis. B. cytokinin
- ( ) 83. Acts by increasing the plasticity of the cell wall. C. gibberellin
- ( ) 84. A gas that hastens fruit ripening. D. ethylene
- ( ) 85. Promotes internode elongation; promotes germination of certain seeds. E. abscisic acid
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- ( ) 86. Some members have a cartilaginous endoskeleton. A. Amphibia
- ( ) 87. Internal fertilization, amniotic egg, skin that resists drying, evolved in late Carboniferous. ( ) 90. Includes snakes, turtles, and lizards. B. Aves
- ( ) 88. Three major groups: egg-laying, pouched, and placental. C. Chondrichthyes
- ( ) 89. Includes salamanders, frogs, and toads. D. Mammalia
- E. Reptilia