



KENYATTA UNIVERSITY

UNIVERSITY EXAMINATIONS 2011/2012

SECOND SEMESTER EXAMINATION FOR THE DEGREE OF BACHELOR OF SCIENCE IN BIOCHEMISTRY AND BIOTECHNOLOGY

SCH 315: CONCEPTS IN BIOTECHNOLOGY

DATE: Tuesday 3rd April, 2012

TIME: 4.30 p.m. – 6.30 p.m.

SECTION A: Answer all 20 questions (each question is 1 mark)

1. A complete set of genes is known as
 - A. Nucleoid
 - B. Gene
 - C. Genome
 - D. DNA
 - E. allele
2. The complimentary RNA sequence for GATCAA is
 - A. CTAGTT
 - B. CUAGUU
 - C. AGCTGG
 - D. AGCUGG
 - E. TCGACC
3. The nonprotein part of an enzyme necessary for the enzyme activity is called
 - A. Holoenzyme
 - B. Metalloenzyme
 - C. Isoenzyme
 - D. Prosthetic group
4. Enzymes are important biological catalysts because they:
 - A. Supply the energy to initiate a biochemical reaction.
 - B. Increase the free energy of a biochemical reaction.
 - C. Lower the entropy of a biochemical reaction.
 - D. Decrease the enthalpy of a biochemical reaction.
 - E. Lower the activation energy of a biochemical reaction.

5. The fruit when kept is open, tastes bitter after 2 hours because of
 - A. Loss of water from juice
 - B. Decreased concentration of fructose in juice
 - C. Fermentation by yeast
 - D. Contamination by bacterial enzymes

6. In genetic engineering, plasmids are used to:
 - A. Cut DNA into fragments with sticky ends.
 - B. Multiply DNA sequence of interest
 - C. Protect DNA from restriction enzyme
 - D. Transfer DNA

7. Which of the following is an hybrid process used in effluent treatment
 - A. Percolating filters
 - B. Membrane reactor
 - C. Fluidized bed reactor
 - D. Activated sludge process

8. Sterilization:
 - A. involves the removal of all microorganisms including the spores.
 - B. can be achieved by wiping surgical instruments with alcohol swab.
 - C. can be achieved by boiling surgical instruments in water for 10 minutes.
 - D. A and C
 - E. All of the above

9. When isolating proteins lacking a readily measurable biological activity, the progress of purification can be monitored using:
 - A. Agarose-based matrices
 - B. Western blotting or ELISA (Enzyme-Linked-Immuno-sorbent Assay)
 - C. Affinity chromatography
 - D. Spectrophotometric or colorimetric method
 - E. All of the above

10. Genetic engineering requires enzyme:
 - A. DNA ase
 - B. Amylase
 - C. Lipase
 - D. Restriction endonuclease

11. Insulin is a protein which controls
 - A. Blood clotting
 - B. Metabolic pathway
 - C. Digestion
 - D. Kreb's cycle

12. The ability of the cell membrane to act as a selective barrier depends upon
- A. The lipid composition of the membrane
 - B. The pores which allows small molecules
 - C. The special mediated transport systems
 - D. All of the above
13. The most active site of protein synthesis is the
- A. Nucleus
 - B. Ribosome
 - C. Mitochondrion
 - D. Cell sap
14. Which of the following compounds used in microorganism control is known to cause brain damage
- A. Parasulfone dichloroamidobenzoic acid
 - B. Sodium hypochlorite
 - C. Hexachlorophene
 - D. Calcium hypochlorite
 - E. Orthocresol
15. Parts of the enzyme molecule that interact with a substrate are called:
- A. Cofactors.
 - B. Active sites.
 - C. Induced-fit models.
 - D. Orientation sites.
 - E. Reaction sites.
16. Cutting an entire chromosome with a restriction enzyme produces many fragments, only one of which contains the gene to be isolated. A specific for the gene will isolate the fragment containing the gene of interest.
- A. Restriction enzyme
 - B. DNA probe
 - C. Plasmid
 - D. Restriction endonuclease
 - E. Any of the above
17. Microorganism are able to utilize phosphorus to make the following components except?
- A. Cell wall
 - B. Nucleic acids
 - C. Lipids
 - D. Sugars

18. Isolation of natural products differs from that of the more prevalent biological macromolecules because:
- A. Synthetic macromolecules are more complex
 - B. Natural products are smaller in size, more chemically diverse and exists in smaller concentrations than synthetic macromolecules
 - C. Synthetic chemicals are more expensive to isolate
 - D. All of the above
19. What level of natural compound purity is required in X-ray crystallographic studies?
- A. 95 to 99 %
 - B. 99%
 - C. 99.9%
 - D. 100%
 - E. 50 to 99%
20. The optimum pH for yeasts is
- A. 6.5-7.5
 - B. 4-5
 - C. 4-7
 - D. 3.5

SECTION B: Answer ALL questions (5 MARKS EACH)

1. a) Define the following terms:
- i. DNA
 - ii. Chromosome
 - iii. Gene
 - iv. Allele
 - v. Locus
 - vi. Genotype
 - vii. Phenotype
 - viii. Diploid
 - ix. Autosomal
 - x. Sex chromosomes
- b) Outline the characteristics of the genetic code
2. Describe the cell as the structural and functional unit of living organisms
3. a) Using illustrations, explain how catalyzed and uncatalyzed reactions differ
b) Describe how enzyme binding energy contributes to reaction specificity and catalysis
4. Discuss the use of the following microbial control methods
- a) Pasteurization
 - b) Ultrahigh-temperature (UHT) sterilization
 - c) Ultraviolet Radiation

5. Explain the generic outline for protein purification
6.
 - a) Define the term fermentation
 - b) Discuss the substrates for fermentation processes, highlighting their suitability and respective products

SECTION C: Answer ANY TWO questions (10 marks each)

1. Describe the general enzyme production procedure
2. Describe the activated sludge process used in effluent treatment
3. Describe the general steps involved in production of genetically engineered insulin