

單選題 (32%) (每題 2 分，答錯倒扣 0.5 分)

1. An individual molecular structure within an antigen to which an individual antibody binds is as a(n):
A) antigen. B) epitope. C) Fab region. D) Fc region. E) MHC site.
2. The energy that is released by the hydrolysis of ATP by actin is used for:
A) actin filament assembly. B) actin filament disassembly. C) actin-myosin assembly.
D) actin-myosin disassembly. E) muscle contraction.
3. Which of the following is *not* a reducing sugar?
A) Fructose B) Glucose C) Glyceraldehyde D) Ribose E) Sucrose
4. The biochemical property of lectins that is the basis for most of their biological effects is their ability to bind to:
A) amphipathic molecules. B) hydrophobic molecules. C) specific lipids.
D) specific oligosaccharides. E) specific peptides.
5. RFLP is a:
A) bacteriophage vector for cloning DNA. B) genetic disease. C) protein.
D) plasmid vector for cloning DNA. E) variation in DNA base sequence.
6. Which one of the following analytical techniques does not help illuminate a gene's cellular function?
A) DNA microarray analysis B) Protein chip analysis C) Southern blotting
D) Two-dimensional gel electrophoresis E) Two-hybrid analysis
7. A common cloning strategy for introducing foreign genes into plants with *Agrobacterium* employs all the following features except:
A) a selectable antibiotic marker such as kanamycin resistance.
B) a shuttle vector with 25 bp T-DNA repeats flanking the foreign gene of choice.
C) a Ti plasmid lacking its T-DNA segment.
D) active *vir* gene products from the altered Ti plasmid.
E) an ability to induce crown gall formation in infected leaves.
8. A hydropathy plot is used to:
A) determine the water-solubility of a protein.
B) deduce the quaternary structure of a membrane protein.
C) determine the water content of a native protein.
D) extrapolate for the true molecular weight of a membrane protein.
E) predict whether a given protein sequence contains membrane-spanning segments.
9. The structure of NAD^+ does not include:
A) a flavin nucleotide. B) a pyrophosphate bond. C) an adenine nucleotide.
D) nicotinamide. E) two ribose residues.
10. The conversion of 1 mol of fructose 1,6-bisphosphate to 2 mol of pyruvate by the glycolytic pathway results in a net formation of:
A) 1 mol of NAD^+ and 2 mol of ATP. B) 1 mol of NADH and 1 mol of ATP.
C) 2 mol of NAD^+ and 4 mol of ATP. D) 2 mol of NADH and 2 mol of ATP.
E) 2 mol of NADH and 4 mol of ATP.
11. In an anaerobic muscle preparation, lactate formed from glucose labeled in C-3 and C-4 would be labeled in:
A) all three carbon atoms. B) only the carbon atom carrying the OH.

- C) only the carboxyl carbon atom. D) only the methyl carbon atom.
E) the methyl and carboxyl carbon atoms.
12. Which of the following is true of glycogen synthesis and breakdown?
A) Phosphorylation activates the enzyme responsible for breakdown, and inactivates the synthetic enzyme.
B) Synthesis is catalyzed by the same enzyme that catalyzes breakdown.
C) The glycogen molecule "grows" at its reducing end.
D) The immediate product of glycogen breakdown is free glucose.
E) Under normal circumstances, glycogen synthesis and glycogen breakdown occur simultaneously and at high rates.
13. A function of the glyoxylate cycle, in conjunction with the citric acid cycle, is to accomplish the:
A) complete oxidation of acetyl-CoA to CO₂ plus reduced coenzymes.
B) net conversion of lipid to carbohydrate.
C) net synthesis of four-carbon dicarboxylic acids from acetyl-CoA.
D) net synthesis of long-chain fatty acids from citric acid cycle intermediates.
E) both B and C are correct.
14. The amino acids serine, alanine, and cysteine can be catabolized to yield:
A) fumarate. B) pyruvate. C) succinate. D) α -ketoglutarate. E) none of the above.
15. Which one of the following best describes the role of mitochondria in apoptosis?
A) Escape of cytochrome c into the cytoplasm.
B) Increased rate of fatty acid β -oxidation.
C) Increase in permeability of outer membrane.
D) Uncoupling of oxidative phosphorylation.
E) Both A and C are correct.
16. Which of the following statements about the light reactions in photosynthetic plants is false?
A) A membrane-bound ATPase couples ATP synthesis to electron transfer.
B) No CO₂ is fixed in the light reactions.
C) The ultimate electron acceptor is O₂.
D) The ultimate source of electrons for the process is H₂O.
E) There are two distinct photosystems, linked together by an electron transfer chain.

問答及簡答 (48 %):

- Describe the process of semicontinuous DNA replication. (6%)
- Describe the process for elongation and termination of translation in prokaryotes. (10%)
- What is Shine-Dalgarno sequence? What are the functions of Shine-Dalgarno sequence. (4%)
- Name the enzymes that catalyzing the first step in the glycolysis, the pentose phosphate pathway, and fatty acid synthesis, respectively. (6%)
- Draw the structures of (1) glutamate, (2) proline, and (3) hydrogen-bonded adenine and thymine (6%)
- Describe the functions of the following reagents used in SDS-polyacrylamide gel electrophoresis. (10%)
(1) acrylamide (2) bisacrylamide (3) TEMED (4) SDS (5) ammonium persulfate
- Specify the mode of action of the following antibiotics on inhibition of protein syntheses: (6%)
(1) puromycin (2) tetracyclines (3) diphtheria toxin

解釋名詞 (20%)

1. yeast two hybrid analysis
2. scfv
3. single nucleotide polymorphisms (SNPs)
4. site-directed mutagenesis
5. two dimensional gel electrophoresis
6. homeotic genes
7. cAMP receptor protein (CRP)
8. actinomycin D and rifampicin
9. expressed sequence tag and epitope tag
10. transcriptome profiling