銘傳大學 95 學年度轉學生招生考試

生物科技學系

7 月 26 日第四節　　（第 1 頁共 4 頁）

生物化學試題　　（限用答案本作答）

※注意: 請依序作答，並標明作答之題號

I. Single-choice problems (30%)

1. In phase 1 of glycolysis, the appropriate sequence of enzymes is:

   A: phosphofructokinase-1 (PFK-1)

   B: hexokinase / glucokinase.

   C: fructose bisphosphate aldolase.

   D: triose phosphate isomerase (TPI)

   a. A,C,B,E,D
   b. B,C,D,E,A
   c. B,D,C,A,E
   d. D,B,A,C,E
   e. B,D,E,C,A

2. All are characteristics of Okazaki fragments EXCEPT:
   a. newly synthesized short lagging strand fragments.
   b. Synthesis performed in the 5'→ 3' direction.
   c. Initiated with an RNA primer.
   d. About 20-30 nucleotides in length.
   e. Binds anti-parallel to the template strand.

3. When acetyl-CoA levels exceed the _____ supply, allosteric activation of _____ by _____ raises the oxaloacetate (OAA) levels for condensation with acetyl-CoA to form _____ .
   a. citrate; citrate synthase; acetyl-CoA; citrate
   b. malate; malate dehydrogenase; ATP; citrate
   c. OAA; citrate synthase; acetyl-CoA; isocitrate
   d. OAA; pyruvate carboxylase; acetyl-CoA; citrate
   e. Acetyl-CoA; pyruvate carboxylase; citrate; acetyl-CoA

4. Hemoglobin is an example of a(n):
   a. enzyme
   b. regulatory protein.
   c. storage protein.
   d. structural protein.
   e. transport protein

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5. All are characteristic of plasmids EXCEPT:
   a. naturally occurring, circular extrachromosomal DNA.
   b. able to perpetuate themselves without a host organism.
   c. artificial plasmids can be constructed by restriction endonuclease digestion, insertion, and ligation.
   d. Harbor genes for novel metabolic activities.
   e. an origin of replication must be included in the plasmid to facilitate propagation.
6. All are true for DNA polymerase EXCEPT:
   a. requires a primer with a free 5'-OH end, but the 3'-end may be phosphorylated.
   b. Copies the sequence of nucleotides of one strand to form a new second strand.
   c. Copies the sequence of nucleotides of one strand in a complementary fashion.
   d. Generates dsDNA from ssDNA.
   e. synthesizes new strands by adding successive nucleotides in the 5' → 3' direction.
7. RNA is _____ stable to alkaline hydrolysis than DNA because RNA's vicinal ___ ____ Group makes the 3'- phosphodiester bond susceptible to _____cleavage.
   a. less; 3'-OH; nucleophilic
   b. less; 2'-OH; nucleophilic
   c. more; 2'-OH; electrophilic
   d. more; 2'-OH; nuceophilic
   e. more; 3'-OH; electrophilic
8. Platelet activationg factor (PAF) has all of the characteristics EXCEPT:
   a. PAF is a potential mediator in inflammation, allergic responses and shock.
   b. PAF is a sphingolipid.
   c. PAF has a beneficial effect on toxic-shock syndrome.
   d. PAF is involved in implantation of the egg in the uterine wall.
   e. PAF stimulates production of fetal lung surfactant.
9. All of the following statements about the nature of glycogen are true EXCEPT:
   a. It is a polysaccharide used for storage.
   b. It is a branched polymer of linked glucose residues.
   c. It has all non-reducing ends.
   d. The highly branched structure allows the rapid mobilization of glucose during metabolic need.
   e. It is found primarily in the liver and skeletal muscles.

生物化學試題 （限用答案本作答）

10. Alpha helices are stabilized primarily by:
    a. hydrogen bonds between the main chain peptide bond component atoms.
    b. electrostatic interactions between R-groups.
    c. hydrophobic interactions between the α-carbons of the main chain.
    d. hydrogen bonding between the R-groups.
    e. hydrophobic interactions between R-groups and the solvent water.
11. The reactions, base + PRPP → nucleoside-5-phosphate + PP_i is catalyzed by the enzyme:
    a. nucleotide diphosphate kinase.
    b. GMP synthetase.
    c. ribose-5-phosphate pyrophosphokinase.
    d. adenylate kinase.
    e. phosphoribosyltransferase.
12. All of the amino acids EXCEPT _____ have both free α-amino and free α-carboxyl groups.
    a. valine
    b. proline
    c. asparagine
    d. lysine
    e. aspartic acid
13. All are characteristics of anabolism EXCEPT:
    a. assembly of complex molecules.
    b. formation of new covalent bonds.
    c. ATP provides energy.
    d. NADPH is an electron donor.
    e. all are true.
14. Dehydrogenases are enzymes that:
    a. move bydrogens within the molecule.
    b. add gydrogens across double bonds.
    c. transfer gydrogens between substrates.
    d. transfer gydride ions to NAD^+ (or $NADP^+$) and release a proton.
    e. all are true.
15. The *lac repressor* is an example of a(n):
    a. enzyme
    b. regulatory protein.
    c. transport protein.
    d. storage protein.
    e. structural protein.

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生物化學試題 （限用答案本作答）

Ⅱ. Questions (70%)

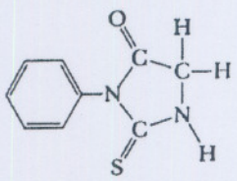
1. Amino acid analysis of an octapeptide revealed the following composition:

   2Arg 1Gly 1Met 1Trp 1Tyr

   1Phe 1Lys

The following facts were observed:

a. Edman degradation gave



b. CNBr treatment yielded a pentapeptide and tripeptide containing phenylalanine.

c. Chymotrypsin treatment yielded a tetrapeptide containing a C-terminal indole amino acid and two dipeptides.

d. Trypsin treatment yielded a tetrapeptide, a dipeptide, and free Lys and Phe.

e. Clostripain yielded a pentapeptide, a dipeptide, and free Phe.

What is the amino acid sequence of this octapeptide ? (10%)

2. Draw structure and give the one-letter and three-letter abbreviations for Phenylalanine, Tyrosine, Tryptophan, Glutamine, Lysine ? (15%)

3. What is the structure and chemistry of Fatty acids ? (5%)

4. Define cloning of DNA ? (5%)

5. Define the following terms: (20%)

   (a) sticky end

   (b) essential amino acids

   (c) transcription

   (d) Anti-sense RNA

   (e) allosteric regulation

   (f) G protein

   (g) RNA interference (RNAi)

   (h) nucleoside

   (i) glycolysis

   (j) TCA cycle

6. Draw the following structures: (10%)

   (a) glucose

   (b) maltose

   (c) sucrose

   (d) lactose

   (e) triacylglycerol

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7. Differences between DNA and RNA ? (5%)

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