所別：企業管理學系碩士班 一般乙組(一般生)　科目：生物化學(含分子生物學)　共 2 頁 第 1 頁

本科考試禁用計算器

＊請在試卷答案卷（卡）內作答

Part I. Multiple choice questions (total 50%): each of questions or incomplete statements below is followed by five suggested answers or completions. Select the one that is best in each case.

1. Which of the following amino acid residues is LEAST likely to be found in transmembrane domain of a protein?
   (a) Arginine (b) Isoleucine (c) Leucine (d) Valine (e) Glycine

2. An enzyme facilitates chemical reactions by:
   (a) Raising the activation energy of the reaction
   (b) Lowering the activation energy of the reaction
   (c) Decreasing the free-energy difference between reactants and products
   (d) Increasing the free-energy difference between reactants and products
   (e) None of the above

3. Which of the following is a heteropolysaccharide?
   (a) Glucogen (b) Starch (c) Hyaluronate (d) Cellulose (e) Chitin

4. Which of the following description about glycogen is **NOT TRUE**?
   (a) A homopolysaccaride of glucose units
   (b) The ($\alpha 1 \rightarrow 6$) linkage is found in branches
   (c) Each subunit is connected by ($\alpha 1 \rightarrow 4$) glycosidic bonds
   (d) Each subunit is connected by ($\beta 1 \rightarrow 4$) glycosidic bonds
   (e) A tightly coiled helical structure stabilized by hydrogen bonds

5. Which of following statements about NAD^+ is **TRUE**?
   (a) In its oxidized form is NADH
   (b) Transfer electrons in reductive biosynthesis
   (c) Accepts 1 electrons and 1 hydrogen ions
   (d) Accepts 2 electrons and 2 hydrogen ions
   (e) Accepts 2 electrons and 1 hydrogen ions

6. Which of following acts as a "carrier" of fatty acids across the inner mitochondrial membrane?
   (a) Serum albumin (b) APoC-II (c) Apolipoprotein (d) Bile salt (e) Carnitine

7. Which compound links glycolysis, nucleotide synthesis, and glycogen synthesis?
   (a) Acetyl-CoA (b) Oxaloacetate (c) Citrate (d) Glucose 6-phosphate (e) Glycerol 3-phosphate

8. Which of the following does not provide a carbon skeleton for the synthesis of amino acids?
   (a) α-ketoglutarate (b) Pyruvate (c) Succinate (d) Oxaloacetate (e) Ribose 5-phosphate

9. Which of the following descriptions is **NOT TRUE**?
   (a) Storage of fatty acids in organism is largely in the form of triacylglycerols
   (b) Glycerophospholipid contains two acyl side chains and both are saturated
   (c) Fat rich in unsaturated fatty acids are liquid
   (d) Phosphatidylcholine is the chief phospholipids found in membranes of animal cells
   (e) Free sphingolipid base is toxic for cells, but it is the backbone structure for all sphingolipids

10. In order to examine the citric acid cycle, you have obtained a pure preparation of isolated, intact mitochondria. You add some succinyl-CoA to the suspension of isolated, intact mitochondria. How many moles of ATP would you expect to be generated in one turn of the citric acid cycle from each mole of succinyl-CoA added to the test tube?
    (a) 3 (b) 4 (c) 5 (d) 5.5 (e) No ATP would form under these conditions

11. Which of the following enzymes converts purine to nucleotides?
    (a) Acyl-CoA dehydrogenas (b) Phosphoribosyltransferase (c) Reductase (d) Phospholipase (e) Thymidylate synthase

12. All of the following enzymes are linked to the reduction of NADH except:
    (a) Isocitrate dehydrogenase (b) Lactate dehydrogenase (c) Succunate dehydrogenase (d) Pyruvate dehydrogenase (e) α-ketoglutarate dehydrogenase

13. Which enzyme is required to produce urea from arginine?
    (a) Transaminase (b) Arginine dehydrogenase (c) Argininosuccinase (d) Arginase (e) Arginine synthetase

14. The citric acid cycle and the urea cycle overlap to form what has sometimes been called the "Krebs bicycle" which of the following statements is relevant to the interactions between these two metabolic cycles?
    (a) Oxaloacetate is converted to aspartate
    (b) Aspartate combines with citrulline to produce argininosuccinate in the cytosol
    (c) Argininosuccinate is cleaved to fumarate and arginine
    (d) Fumarate is citric acid cycle intermediate
    (e) All of the above are true

15. Beta oxidation of a fatty acids occurs in
    (a) Mitochondria (b) Plasma membrane (c) Golgi (d) Peroxisome (e) Cytosol

16. Formation of bilirubin occurs in
    (a) Liver (b) Spleen (c) Blood (d) Adipose tissue (e) Heart

注意：背面有試題

17. The drug, mevinolin, is developed to prevent heart attack by inhibiting which enzyme in cholesterol biosynthesis?
(a) Thiolase (b) HMG-coA synthase (c) HMG-CoA reductase (d) Mevalonate kinase (e) acyl-CoA cholesterol acyltransferase

18. Which of the following enzyme that aspirin acts on
(a) Acyl-CoA dehydrogenase (b) Phospholipase (c) Reductase (d) Cyclooxygenase (e) Thymidylate synthase

19. The individuals who are deficient in which of following enzymes are the one most sensitive to antimalarial drugs primaquine
(a) 6-phosphogluconate dehydrogenase
(b) Glutamate dehydrogenase
(c) Lactonase
(d) Glyceraldehyde-3-phosphate dehydrogenase
(e) Glucose-6-phosphate dehydrogenase

20. The phosphodiester bonds that link adjacent nucleotides in DNA:
(a) Join the 3' hydroxyl of one nucleotides to the 5' hydroxyl of the next
(b) Are positively charged
(c) Always link A with T and C with G
(d) Are positively charged and always link A with T and C with G
(e) Are positively charged and Join the 3' hydroxyl of one nucleotides to the 5' hydroxyl of the next

21. Two molecules of double-stranded DNA are the same length (1000 base pairs), but differ in base composition. Molecule 1 contains 70% A+T; molecule 2 contains 30% A+T. Which molecule has a higher tm (melting point)? How many C residues are there in the 70% A+T DNA molecule?
(a) 2; 30 (b) 1; 300 (c) 2; 700 (d) 1; 700 (e) 2; 300

22. Which of the following description is **NOT TRUE**?
(a) Eukaryotic transcripts contain poly A tail
(b) Eukaryotic genes contain introns
(c) Eukaryotic transcripts have SD sequence for ribosome binding
(d) Prokaryotic transcription occurs in the cytosol
(e) Prokaryotic transcripts contain more than one gene sequence

23. An *E. coli* strain lacking RecA would be deficient in
(a) Transcription (b) Translation (c) DNA repair (d) Splicing (e) Degradation

24. Which of the following is most likely to lead to a loss of gene function?
(a) A change from a TGA codon to a TAA codon in the coding region
(b) A change from C to T in an enhancer region
(c) A change from A to G in the open reading frame
(d) A frameshift mutation in promoter region
(e) A single nucleotide polymorphism in coding region

25. Which of the following description about nucleotides excision repair is **TRUE**?
(a) Damaged nucleotides are removed by nick translation
(b) DNA ligase catalyzes the final reaction
(c) Deficiency of this enzyme in humans greatly increases the risk of skin cancer
(d) The first enzyme in this pathway cleaves two phosphodiester bonds
(e) All above

Part II Essay Questions (total 50%): Please answer the following questions as sufficient as you can.

1. What is the net reaction of the calvin cycle? Include energy inputs and electron carriers. (5%)

2. Glycosylation is to link carbohydrate groups to polypeptide chains. N-linked is to attach oligosaccharide to which amino acid of protein and is processed in which organelle? What are the biological functions of N-linked glycosylation and its importance in drug markets? (10%)

3. Partial hydrogenation of commercial vegetable oil produced in food industry converts some cis fatty acids to trans fatty acids. What is the purpose of partial hydrogenation of oil? What is the effect of dietary intake of trans fatty acid? (10%)

4. What is the final product of glycolysis? How does animal cells use this product in aerobic condition and in anaerobic condition? How is this product used in beer brewing or biofuel production? (10%)

5. Eukaryotic Chromosomes are linear. What is specialized structure in the end of chromosomes? The chromosome end shortening is one theory of aging. Which enzyme can prevent the end shortening and how? Why is the prevention of the end shortening related to development of cancer cells? (15%)

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