

科目：生物化學

系所：生命科學系

是否使用計算機：是

考試時間：100 分鐘

本科原始成績：100 分

**I. Choose the one best response to each following questions. (45 points)**

1. Which of the following statements is **true**? (A) Xylose is a tetrose. (B) D-galactose and D-glucose are epimeric at C-4. (C) The anomer of  $\alpha$ -D-glucopyranose is  $\alpha$ -L-glucopyranose. (D) Sucrose is a reducing sugar. (E) Mild oxidation of  $\beta$ -D-glucopyranose with alkaline Cu (II) (Fehling's solution) produces D-glucuronic acid.
2. Which of the following statements is **not true**? (A) Monitoring changes in the amount of glycosylated hemoglobin is an especially useful means of assessing the effectiveness of treatments for diabetes mellitus. (B) Dolichol phosphate is the mediator of N-linked glycoproteins which acquired the initial sugars in the golgi. (C) Glycosaminoglycans are acidic (anionic), through the presence of either sulfate or carboxylate groups. (D) Chitin is a homopolymer of acetylgalactosamine with  $\beta$  (1 $\rightarrow$ 4) linkages. (E) The most common linkages between sugar residues in disaccharides, oligosaccharides and polysaccharides is absent 1 $\rightarrow$ 5.
3. Which of the following statements is **not true**? (A) Most naturally occurring fatty acids contain an even number of carbon atoms. (B) If double bonds are present (unsaturation), they are usually cis form. (C) The 90% spermaceti oil is a mixture of triacylglycerols and waxes containing an abundance of saturated fatty acids. (D) Waxes are formed by esterification of fatty acids and long-chain alcohols, which can serve energy stores and water repellents. (E) The major composition of olive oil is C16 and C18 unsaturated fatty acids.
4. Which of the following statements is **not true**? (1) The lipids of archaeal membranes do not contain a carboxylic acid ester, but instead have an ether link to the glycerol. (2) A suspension of triacylglycerols and glycerophospholipids is most likely to form a liposome. (3) A bacterium such as *E. coli* is shifted from a warmer growth temperature to a cooler growth temperature, it compensates by adding more unsaturated fatty acids into its membranes. (4) Human B blood type is determined by the expression of  $\alpha$ -1,3-N-galactosylaminyltransferase. (5) Phosphatidylserine is exclusively in the inner leaflet of the plasma membrane of the human erythrocyte membrane and is widely used in apoptosis detection.  
(A) 1 and 3, (B) 2 and 4, (C) 3 and 5, (D) only 4, (E) only 5.
5. Once acetylcholine binds to its receptor in the postsynaptic membrane, the membrane first becomes to open \_\_\_\_\_ channel, resulting in a depolarization. Then, followed by an outward flow of \_\_\_\_\_, resulting in a hyperpolarization.  
(A)  $\text{Ca}^{2+}$ ,  $\text{Cl}^-$  (B)  $\text{K}^+$ ,  $\text{Cl}^-$  (C)  $\text{Na}^+$ ,  $\text{Ca}^{2+}$  (D)  $\text{Na}^+$ ,  $\text{K}^+$  (E)  $\text{Na}^+$ ,  $\text{Cl}^-$
6. The equivalent of \_\_\_\_\_ high-energy phosphates and \_\_\_\_\_ water molecules are consumed per mole of glucose synthesized by gluconeogenesis.  
(A) 6, 6. (B) 6, 11. (C) 11, 6. (D) 4, 11. (E) 4, 11.

國立高雄大學 109 學年度研究所碩士班招生考試試題

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7. The metabolism of propionic acid (propionate) derived from odd-chain fatty acid degradation require

1. biotin, 2. cobalamin, 3. niacin, 4. pyridoxine, 5. riboflavin, 6. thiamine.

(A) 1 and 2, (B) 2 and 3, (C) 3 and 4, (D) 4 and 5, (E) 5 and 6.

8. (A) Maltose, (B) Lactose, (C) Sucrose, (D) Trehalose, (E) Cellobiose is available primarily as an artificial sweetener, derived from starch.

9. Which of the following enzymes can catalyze hydrogen peroxide into water?

1. catalase, 2. oxidase, 3. oxygenase, 4. peroxidase, 5. superoxide dismutase.

(A) Only 1, (B) only 5, (C) 1 and 5, (D) 1 and 4, (E) 4 and 5.

10. Which of the following metabolic pathways **is not** the possible fate of oxaloacetate (OAA)?

(A)  $OAA \leftrightarrow$  phosphoenolpyruvate, (B)  $OAA \leftrightarrow$  pyruvate, (C)  $OAA \leftrightarrow$  aspartate,

(D)  $OAA \leftrightarrow$  glutamate, (E)  $OAA \leftrightarrow$  malate.

11. Which of the following enzymes **does not** catalyze  $CO_2$  production? (1) isocitrate dehydrogenase,

(2)  $\alpha$ -ketoglutarate dehydrogenase, (3) succinate dehydrogenase, (4) pyruvate dehydrogenase,

(5) malate dehydrogenase.

(A) only 2, (B) only 5, (C) 1 and 3, (D) 3 and 5, (E) 2 and 4.

12. \_\_\_\_\_ decreases both oxygen consumption and ATP synthesis, but \_\_\_\_\_ increases oxygen consumption while decreasing ATP synthesis.

(A) Rotenone, 2,4-dinitrophenol. (B) Oligomycin, 2,4-dinitrophenol.

(C) 2,4-Dinitrophenol, Oligomycin. (D) Oligomycin A, rotenone.

(E) 2,4-Dinitrophenol, rotenone.

13. After a meal or rest, phosphoprotein phosphatase 1 can \_\_\_\_\_ phosphorylase a, \_\_\_\_\_ phosphorylase kinase, and \_\_\_\_\_ glycogen synthase.

(A) active, active, active, (B) inactive, inactive, inactive, (C) inactive, active, active,

(D) inactive, inactive, active, (E) active, inactive, active,

14. When the cells require both NADPH and ribose 5-phosphate, the fate of glucose 6-phosphate (G6P) is:

(A)  $G6P \rightarrow$  ribulose 5-phosphate (R5P).

(B)  $G6P \rightarrow R5P \rightarrow$  fructose 6-phosphate (F6P) + glyceraldehyde 3-phosphate (G3P)  $\rightarrow G6P$ .

(C)  $G6P \rightarrow F6P + G3P$ .

(D)  $G6P \rightarrow R5P \rightarrow F6P + G3P \rightarrow$  pyruvate.

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15. Which of the following statements about ketone bodies is **incorrect**? (A) Ketone bodies are formed from acetyl CoA when fat breakdown predominates. (B) The major site of production of acetoacetate and 3-hydroxybutyrate is liver. (C) In the mitochondria, 3-hydroxy-3-methyl-glutaryl-CoA (HMG-CoA) is acted by HMG-CoA lyase to yield acetoacetate plus acetyl-CoA. (D) High ketone bodies levels will rise the blood pH. (E) To consume a healthy dose of odd-chain fatty acids is a ketogenic- advised diet.

**II. Please match the symptoms if the deficiency of the following noncoenzyme vitamins (10 points).**

- |              |   |
|--------------|---|
| 1. Vitamin A | [ ] rickets and skeletal deformities.                             |
| 2. Vitamin C | [ ] night blindness, cornea damage.                               |
| 3. Vitamin D | [ ] subdermal hemorrhaging  |
| 4. Vitamin E | [ ] inhibition sperm production, fragile erythrocytes for humans. |
| 5. Vitamin K | [ ] scurvy  |

**III. Explain the following terms (10 points) and draw the amino acids structure (3~6, 20 points)**

1. Saponification (4 points)
2. Please compare the definition of oxidase and oxygenases. (6 points)
3. Asparagine
4. Histidine
5. Lysine
6. Cysteine

**IV. Please answer the following question (15 points)**

1. Please indicate the active site of enzyme common features