

系所別:

生命科學系

科目:

生物化學

Biochemistry

(total 100 %)

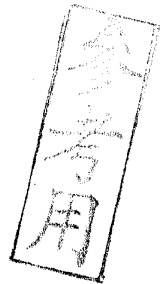
1. Bacteria can undergo net synthesis of carbohydrate from fat via glyoxylate cycle.
 - (a) What are the two enzymes of the cycle that bypass the CO_2 -generating reactions of citric acid cycle? (3%)
 - (b) Which product or intermediate is transported from glyoxysome to mitochondria for gluconeogenesis? (3%)

2. How many high-energy phosphates are generated or consumed in
 - (a) oxidizing 1 mole of NADH via DHAP/G3P shuttle? (3%)
 - (b) converting 2 moles of lactate to glucose? (3%)
 - (c) converting 1 mole of acetyl-CoA to CO_2 ? (3%)

3. Please specify the molecular functions of the following compounds:
 - (a) 2,3-bisphosphoglycerate (2,3BPG) (3%)
 - (b) Diisopropyl fluorophosphates (DFP) (3%)
 - (c) oligomycin (3%)
 - (d) Nalidixic acid (3%)
 - (e) Ethidium bromide (EtBr) (3%)
 - (f) Actinomycin D (3%)

4. Please answer the following questions related to amino acids and proteins.
 - (a) Proline is a cyclic amino acid. Please draw its chemical structure. (3%)
 - (b) Draw the structures of the two amino acids that account for most of the UV absorbance at 280 nm. (3%)
 - (c) Why is IPTG (isopropyl β -thiogalactoside) commonly used as an inducer during protein purification? (3%)

5. Define the following terms:
 - (a) Suicide substrate (3%)
 - (b) Abzyme (3%)
 - (c) Nick translation (3%)
 - (d) The Michaelis constant, K_M (3%)
 - (d) Mutarotation (3%)
 - (e) Polymerase chain reaction (3%)



注意：背面有試題

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6. Lipid metabolism.
- (a) Explain why triglyceride, but not glycogen, is the stored energy used for seabird migration. (2%)
 - (b) How many ATPs are produced from the oxidation of oleic acid (18:1)? (4%)
 - (c) What are the major differences between β -oxidation and biosynthesis of fatty acids? (6%)
 - (d) Explain why LDL is considered bad but HDL is considered as good. (2%)
 - (e) Explain how aspirin acts the anti-inflammatory drug. (2%)
 - (f) Write out the catalysed reaction of HMG-CoA reductase. (2%)
 - (g) What enzyme functions to convert testosterone into dihydrotestosterone? (2%)
7. Amino acid metabolism.
- (a) Explain why glutamate and carbamoyl phosphate are important in the urea cycle. (4%)
 - (b) Explain how tyrosine is biosynthesized in animals. (2%)
 - (c) Which of amino acids is the precursor of heme? (2%)
 - (d) Which of the aromatic amino acids is the precursor for the catecholamines? (2%)
8. Nucleotide metabolism.
- (a) From which of amino acids does each of nitrogen atoms in the purine ring of nucleotide derive? (4%)
 - (b) From which of amino acids does the first nitrogen atom in the pyrimidine ring of nucleotide derive? (2%)
 - (c) Explain why ^3H -radiolabeled thymidine is in preference to thymidine nucleotides used for measuring the rates of DNA replication during cell proliferation. (4%)

參考用