系所組別：生物科學與科技學院-生科聯招

考試科目：生物化學 考試日期：0223，節次：2

※ 考生請注意：本試題不可使用計算機。 請於答案卷(卡)作答，於本試題紙上作答者，不予計分。

Essays (共 10 題，100 分)

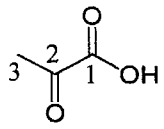
1. What are phospholipids? Their biological functions?

2. Please outline the current methods used to determine 3D structure of a protein.

3. Please give an overview of pentose phosphate pathway.

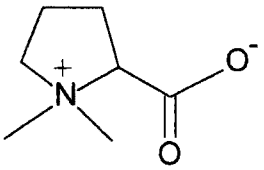
4. The protein colicin E3 is a very effective inhibitor of protein synthesis in prokaryotes. This protein is a nuclease, specifically attacking a phosphodiester bond near the 3' end of the 16S RNA. Suggest a mechanism for the effect of colicin E3 on translation.

5. Consider the fate of pyruvate labeled with ^{14}C in either carbon 1 (carboxyl), 2 (carbonyl), or 3 (methyl). Predict the fate of each labeled carbon during one turn of the citric acid cycle.



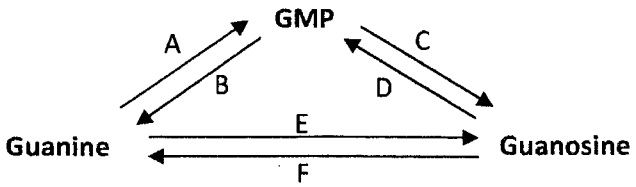
6. Methanol is highly toxic, not because of its own biological activity but because it is converted metabolically to formaldehyde, through action of alcohol dehydrogenase. Part of the medical treatment for methanol poisoning involves administration of large doses of ethanol. Explain why this treatment is effective.

7. Proline betaine is an osmoprotector in plants and bacteria, helping to prevent hydration of cells. Propose a plausible pathway for biosynthesis of this compound.



8. Given the molecular components glycerol, fatty acid, phosphate, long-chain alcohol, and carbohydrates:
   (a) Which two are present in both waxes and sphingomyelin?
   (b) Which two are present in both fats and phosphatidylcholine?
   (c) Which are present in a ganglioside but not in a fat?

9. Identify each reaction catalyzed by (a) a nucleotidase (b) a phosphorylase (c) a phosphoribosyltransferase



10. Briefly introduce the following enzymes:
    (1) isomerase (2) kinase (3) phosphatase (4) reductase (5) fatty acid synthase