第一部份（５０%）

I). Amino acid 之 Catabolic reactions 主要有三種反應，試寫出其反應之英文名稱；並各舉一反應式之實例。 （6%）

II).生化物質 Glucose, Fatty acid 及 Amino acid 之新陳代謝(Metabolism)有何關聯性? 試以簡圖說明之。（8%）

III).寫出與下列各項敘述最直接相關的 α-Amino acid 之英文全名 （11%）

1).合成 Melanin. 2).合成 Pyrimidine. 3).合成 Chlorophyll. 4).合成 NO.
5).合成 Polyamine. 6).合成甲狀腺素. 7).合成植物生長素 Auxin.
8).人體爲解毒將 ammonia 轉成者. 9).由 3-Phosphoglycerate 直接 derived 者.
10).由 Ribose 5-phosphate derived 者. 11).與 ATP 結合直接參與 Urea Cycle 者.

IV).寫出下列文中以劃線指定縮寫之英文全名 （10%）

1).NAD is coenzyme I. 2).SAM is a methyl group donor. 3).The reaction of orotate with PRPP to give OMP. 4).ATP is a high energy compound.
5). PAPS is the activated SO_4^{2-}. 6).The reaction of PCR is used to amplify DNA.
7).GABA is an inhibitory neurotransmitter. 8). PLP is the coenzyme form of vitamin B6. 9).GSH plays a role of buffering in the cell. 10).THFA can serve as donor of one-carbon unit in metabolism.

V).寫出下列與[代謝生化學]相關之名詞或敘述。(如述及化合物或酵素名稱請寫其英文全名，例如 alcohol dehydrogenase 不能寫「酒精去氫酶」，也不可只寫 ADH 之代號)： （15%）

1).何謂「Intermediary metabolism」? 2).鳥類以「uric acid」做爲「disposal of Nitrogen waste」，有何生理意義? 3).魚缸放置生的「金魚草」，主要目的不在「供給氧氣」，而是什麼? 4).治療「痛風 Gout」藥品之藥效，係針對代謝生化之何種酵素? 5).蠶豆症(favism) 與何種酵素最相關?
6).生物能否進行「Urea cycle」最關鍵性的是何種酵素? 7).中藥植物-八角，因含有何種成分而用於製造克流感 (Tamiflu)? 8).「5-Fluorouracil」是臨床用的抗癌藥物，其爲何種酵素之 inhibitor ? 9).膽固醇(Cholesterol)生合成之主要調控酵素爲何? 10).Pyrimidine 經 catabolic degradation 後，會產生一種與 Purine 代謝不一樣，且具 salvageable 性質之 compound 爲何?
11).Nitrogenase complex 的組成除了酵素之外，還需要那一種 Protein?
12).△Go 與 △Go' 所指條件之差異爲何? 13).除人類以外，其他哺乳類 (mammal)少受痛風之苦。何故? 14).將各式各樣 Metabolic pathways 互相聯結的 biomolecule 是那二種? (本小題 2 分，答案可用縮寫)

接背面

第二部份（５０％）

VI.) There are several ways that the activity of an enzyme can be regulated. Please discuss the details. Please indicate which way of regulation may lead to faster metabolic adjustments. An also, please describe how DNA microarrays and 2-D gel electrophoresis may help to study these metabolic regulation. (10%) (Hint: central dogma)

VII) Lipoate, biotin and the combination of β-mercaptoethylamine and pantothenate are three kinds of cofactors. They are covalently bound to three different enzymes, and act in a similar way. Please discuss the common role of these cofactors. And also, please discuss the physiological functions of these three enzymes. (10%)

VIII) Plant receptorlike kinases and Toll-like receptors have similar role in the immune responses in plants and animals, respectively. Please describe the components and the mechanisms in these two signaling pathways. (10%)

IX) Each one of the following groups of terms is related in a particular pathway. Please briefly explain these terms and describe these pathways. Please include their physiological roles in your description and use arrow (⟶) or draw a simple map to link them. Some of them may need extra components. (20%)

1) Arachidonate, COX (cyclooxygenase), salicylate, prostaglandin
2) Malate, oxaloacetate, aspartate aminotransferase, mitochondria
3) UDP-glucose, nonreducing end, G-1-P, glycogen synthase
4) Leptin, JAK (Janus kinase), STAT, IRS-2

試題隨卷繳回