

國 立 宜 蘭 大 學

113 學年度碩士班考試入學招生

生化與生理試題

( 生物技術與動物科學系碩士班 )

准考證號碼：

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《作答注意事項》

1. 請先檢查准考證號碼、座位號碼及答案卷號碼是否相符。
2. 考試時間：100 分鐘。
3. 本試卷共有 50 題選擇題，一題 2 分，共計 100 分。
4. 請將答案寫在答案卷上。
5. 考試中禁止使用手機或其他通信設備。
6. 考試後，請將試題卷及答案卷一併繳交。
7. 本試卷採雙面影印，請勿漏答。
8. 應試時不得使用電子計算機。

**選擇題（50題，每題2分，共計100分）：**

1. 肌肉的最小單位是什麼呢？(A)肌原纖維 (B)肌束 (C)肌絲 (D)肌纖維。
2. 有內臟肌之稱的為下列那一種呢？(A)隨意肌 (B)骨骼肌 (C)平滑肌 (D)心肌。
3. 下列何者為適應高海拔環境的生理調節反應？(A)換氣量減少 (B)動脈血二氧化碳分壓增加 (C)氧合血紅素親和力減少 (D)血球比容減少。
4. 用力呼氣容積（FEV），臨床上FEV1明顯地少於80%即表示病人罹患：(A)肺纖維化症 (B)限制性肺疾病 (C)阻塞性肺疾病 (D)塵肺症。
5. 第二型肺泡細胞能分泌下列何種物質，以避免肺泡在換氣過程中塌陷？(A)表面張力素 (B)彈力蛋白 (C)黏液 (D)水分。
6. 心臟自發性去極化的節律點位於：(A) Sino-Atrial node (B) Atrio-Ventricular node (C) Bundle of His (D) Purkinje fiber。
7. 下列哪個腦區調控個體的生理恆定及存活？(A)小腦 (B)海馬迴 (C)下視丘 (D)視丘。
8. 當肌肉或神經元受到刺激，而且刺激的強度夠大的時候（超過閾值threshold），就會產生肌肉收縮的情況；若果刺激的強度不足，肌肉或神經元便不會作出收縮反應，這個現象稱為：  
(A)亨利定律 (B)反射定律 (C)全有或無定律 (D)波以爾定律。
9. 骨骼肌收縮所需要的鈣離子主要來自細胞內何處？(A)橫小管（T tubule） (B)肌漿網（sarcoplasmic reticulum） (C)粒線體（mitochondria） (D)細胞核（nucleus）。
10. 何者為傳達體感覺之轉接中心？(A)小腦 (B)紅核 (C)下視丘 (D)視丘。
11. 若動物血中的鈣濃度異常，可能的原因會是下列哪個激素所造成？(A)正腎上腺素 (B)鹽皮質素 (C)副甲狀腺素 (D)糖皮質素。
12. 雌性動物的泌乳作用需要泌乳素、催產素與動情素於不同層面作用，使乳汁分泌更加順利，此種稱為內分泌素的？(A)許可性 (B)協同性 (C)啟動效應 (D)去敏感作用。
13. 當雄性血中性激素濃度過高時，睪丸不會透過哪個方式抑制性激素釋放？(A)藉由抑制素負回饋抑制腦垂體前葉對LH的釋放 (B)藉由抑制素負回饋抑制腦垂體前葉對FSH的釋放 (C)藉由性激素負回饋抑制腦垂體前葉對FSH與LH的釋放 (D)藉由性激素負回饋抑制下視丘對GnRH的釋放。
14. 卵母細胞的第二極體會在哪个階段被排出？(A)排卵後 (B)受精作用後 (C)第一次減數分裂後 (D)有絲分裂後。
15. 關於受精卵發育成雄性與雌性的生殖器官與附屬生殖器官的敘述，下列何者不正確？  
(A)華爾夫氏管受到睪固酮刺激分化為副睪 (B)雄性Y染色體表現TDF促進睪丸形成

- (C)體內若無睪固酮，穆勒氏管則發育為雌性的子宮 (D)雄性的前列腺形成需要睪固酮刺激。
16. 水分的再吸收主要在何處發生？(A)近曲小管 (B)遠曲小管 (C)集尿管 (D)亨利氏管。
17. 第二心音是由哪個瓣膜關閉所產生的？(A)靜脈瓣 (B)動脈瓣 (C)房室瓣 (D)以上皆非。
18. 下列何者會增加腎絲球過濾率 (GFR)？(A)增加交感神經興奮 (B)增加血量 (C)增加血中鈉含量 (D)降低血量。
19. 醛固酮 (aldosterone) 可使鈉的再吸收增加，也會使下列何種排泄量增加？(A)尿素 (B)蛋白質 (C)葡萄糖 (D)鉀離子。
20. 換氣次數太少時會引起：(A)呼吸性鹼中毒 (B)呼吸性酸中毒 (C)臉色潮紅 (D)代謝性酸中毒。
21. 家禽的消化道從食道開始的順序為？(A)腺胃→嗉囊→砂囊 (B)嗉囊→砂囊→腺胃 (C)砂囊→腺胃→嗉囊 (D)嗉囊→腺胃→砂囊。
22. 家禽消化道哪個部位具儲藏和濕潤食物的功能？(A)嗉囊 (B)腺胃 (C)砂囊 (D)大腸。
23. 家禽消化道哪個部位具分泌胃蛋白酶的功能？(A)嗉囊 (B)腺胃 (C)砂囊 (D)大腸。
24. 反芻動物中具有分泌溶菌酶功能之消化器官為？(A)皺胃 (B)蜂巢胃 (C)瘤胃 (D)重瓣胃。
25. 哪種動物的消化系統最能有效利用細菌所合成的蛋白質？(A)豬 (B)雞 (C)馬 (D)牛。
26. The reactions of glycolysis occur in this eukaryotic cell compartment:  
(A) Cytoplasm (B) Nucleus  
(C) Mitochondrion (D) Both cytoplasm and mitochondria
27. What is substrate level phosphorylation?  
(A) ATP and AMP synthesis from two molecules of ADP  
(B) Phosphorylation of AMP by ATP  
(C) Phosphorylation of ATP coupled to an ion gradient  
(D) ATP synthesis when the phosphate donor is a substrate with high phosphoryl transfer potential
28. All of the following features are used to characterize the chemical structure of a polysaccharide, except:  
(A) Sugar components (B) Solubility  
(C) Linkage between the sugars (D) Linear or branched

**29. Blood typing depends on:**

- (A) The addition of sucrose to blood before storage:
- (B) The presence of a polysaccharide coating on red blood cells
- (C) The presence of a polysaccharide coating on white blood cells
- (D) The nature of the oligosaccharide portion of glycoproteins on the surface of red blood cells

**30. Protein kinase A (PKA) is:**

- (A) Activated by covalent binding of cyclic AMP
- (B) Affected by cyclic AMP only under unusual circumstances
- (C) Allosterically activated by cyclic AMP
- (D) Competitively inhibited by cyclic AMP
- (E) Noncompetitively inhibited by cyclic AMP

**31. Insulin exerts its effects through:**

- (A) Cyclic AMP
- (B) Tyrosine kinases
- (C) Calcium ions
- (D) Direct action on DNA-binding proteins

**32. Which of the following modifications is likely to happen to the mRNA in a eukaryotic cell?**

- (A) Removal of intervening sequences (introns)
- (B) Capping of the 5' end
- (C) Addition of a poly-A tail to the 3' end
- (D) All of the above occur in eukaryotic cells

**33. Which piece of DNA will have the higher  $T_m$  (if both are heated under the same experimental conditions)?**

- (A) 30% cytosine plus guanine will have the higher  $T_m$
- (B) 50% cytosine plus guanine will have the higher  $T_m$
- (C) Their  $T_m$ 's will be the same
- (D) There's no way to predict for this information

**34. Phosphorylation of enzymes**

- (A) Has no effect on their catalytic activity
- (B) Is not easily characterized
- (C) Usually takes place on serine, threonine, and tyrosine residues
- (D) Does not require ATP

**35. Which of the following four fatty acids has the highest melting point:**

- (A)  $\text{CH}_3\text{CH}_2\text{CH}_2\text{CH}_2\text{CH}_2\text{COOH}$
- (B)  $\text{CH}_3\text{CH}_2\text{CH}_2\text{CH}_2\text{CH}_2\text{CH}_2\text{CH}_2\text{CH}_2\text{CH}_2\text{COOH}$
- (C)  $\text{CH}_3\text{CH}_2\text{CH}_2\text{CH}_2\text{CH}_2\text{CH}_2\text{CH}_2\text{COOH}$
- (D)  $\text{CH}_3\text{CH}=\text{CHCH}_2\text{CH}_2\text{COOH}$

**36. What charged group(s) are present in glycine at a pH of 7?**

- (A)  $-\text{NH}^{3+}$
- (B)  $-\text{COO}^-$
- (C)  $-\text{NH}^{2+}$
- (D) A and B
- (E) A, B, and C

**37. What pairs of atoms in bases are involved in hydrogen bonds?**

- (A) N—H and O—H                      (B) N—H and S—H                      (C) O—H and P—O  
(D) All of the above                      (E) None of the above

**38. Increasing temperature (T) has this effect on enzyme reactions:**

- (A) Temperature has little effect on enzyme reactions  
(B) Increasing T increases the rate of enzyme reactions over wide temperature ranges  
(C) Increasing T increases the rate of enzyme reactions until the heat denatures the enzyme  
(D) Enzymes always work fastest at the normal T of the organism in which they are found

**39. Key properties of proteins include:**

- (A) A wide range of functional groups  
(B) The ability to interact with other proteins  
(C) An ability to possess either rigid or flexible structures as dictated by functional requirements.  
(D) All of the above

**40. Which of the following mechanisms can be used to regulate metabolic pathways?**

- (A) Allosteric activators and inhibitors  
(B) Covalent modifications of enzymes  
(C) Use of separate enzymes at a given point in the forward and backward pathways  
(D) Regulation of the genes for the enzymes used in the pathway  
(E) All of these are used to regulate metabolism

**41. Which of the following enzymes does not use NAD<sup>+</sup> for oxidation?**

- (A)  $\alpha$ -Ketoglutarate Dehydrogenase complex                      (B) Isocitrate Dehydrogenase  
(C) Succinate Dehydrogenase                      (D) Malate Dehydrogenase

**42. Which of the following enzymes is not a control point of the citric acid cycle?**

- (A) Citrate synthase                      (B) Isocitrate dehydrogenase  
(C) Aconitase                      (D) The  $\alpha$ -ketoglutarate dehydrogenase complex

**43. In prokaryotes the site of ATP-synthesizing machinery is:**

- (A) The mitochondrial matrix                      (B) The nucleolus  
(C) The cytoplasmic membrane                      (D) The outer cell wall

**44. High concentrations of fructose-2,6-bisphosphate:**

- (A) Stimulate glycolysis and inhibit gluconeogenesis  
(B) Inhibit glycolysis and stimulate gluconeogenesis  
(C) Stimulate both glycolysis and gluconeogenesis  
(D) Inhibit both glycolysis and gluconeogenesis

**45. In which cellular location do the majority of the reactions of the citric acid cycle take place?**

- (A) The cytosol                      (B) The mitochondrial intermembrane space  
(C) The endoplasmic reticulum                      (D) The mitochondrial matrix

**46. Which would be best to separate a protein that binds strongly to its substrate?**

- (A) Gel filtration      (B) Affinity chromatography      (C) Cation exchange  
(D) Anion exchange      (E) Cation or anion exchange

**47. In the  $\beta$ -pleated sheet conformation:**

- (A) There are hydrogen bonds perpendicular to the direction of the polypeptide chain  
(B) The polypeptide chain is almost fully extended  
(C) The polypeptide chains may be hydrogen bonded together in a parallel or antiparallel orientation  
(D) All of the above

**48. In the induced-fit model of substrate binding to enzymes:**

- (A) The substrate changes its conformation to fit the active site  
(B) The active site changes its conformation to fit the substrate  
(C) There is a conformational change in the enzyme when the substrate binds  
(D) There is aggregation of several enzyme molecules when the substrate binds

**49. In the following peptide, which amino acid is the N-terminus? Phe-Ala-Gly-Arg**

- (A) Ala      (B) Phe      (C) Phe and Arg      (D) Arg      (E) None of the above

**50. Which of the following terms describes an enzyme that catalyzes electron transfer reactions?**

- (A) Isomerase      (B) Dehydrogenase      (C) Kinase      (D) Phosphatase