

科目：普通生物學

系組：生命科學系

年級：二

SECTION A (90%) 每題 2 分

**Directions:** Each of the questions or incomplete statements below is followed by **four or five** suggested answers or completions. Selection the **one** that is **best** in each case on the answer sheet.

1. 下列何者是細胞內的發電廠？(A)細胞核，(B)核糖體，(C)溶小體，(D)粒線體。
2. 下列何者功能為合成蛋白質？(A)細胞核，(B)粒線體，(C)核糖體，(D)溶小體。
3. 轉譯(translation)是指下列何者？(A)以 DNA 為模板合成 RNA，(B)以 RNA 為模板合成 DNA，(C)以 tRNA 為模板合成蛋白質，(D)以 mRNA 為模板合成蛋白質。
4. 有絲分裂的哪一期，染色體明顯往兩極移動？(A)前期，(B)中期，(C)後期，(D)末期。
5. 染色質位於何種胞器？(A)細胞核，(B)高基氏體，(C)核糖體，(D)內質網。
6. 血液中的白血球能將入侵體內的細菌分解，主要依賴何者？(A)粒線體，(B)溶酶體，(C)核糖體，(D)高基氏體。
7. 複製羊的過程是先從 A 羊取出細胞核，再從 B 羊取出卵細胞，然後將 A 羊細胞核植入 B 羊已去核之卵細胞，最後將胚胎放入另一隻 C 羊體內，生下的羊就是桃莉，所以桃莉的外觀會是誰呢？(A)A 羊，(B)B 羊，(C)羊，(D)都有可能。
8. 一個母細胞經由減數分裂後，可產生多少個子細胞？(A)1，(B)2，(C)4，(D)8。
9. 下列哪個部位存在最新鮮的含氧血？(A)左心房，(B)左心室，(C)右心房，(D)右心室。
10. 下列何者為生命中樞？(A)小腦，(B)延腦，(C)大腦，(D)下視丘。
11. 下列何者不是交感神經興奮產生的作用？(A)肚子餓，(B)心跳加快，(C)血管收縮，(D)呼吸加速。
12. DNA 的雙股螺旋結構中，鹼基 G 與 C 彼此以幾個氫鍵連結？(A)1，(B)2，(C)3，(D)4。
13. B 型血的人可以輸血給哪些血型人？(A)B 型與 O 型，(B)B 型與 A 型，(C)O 型，(D)B 型與 AB 型。
14. 一個色盲男性與一個正常女性結婚，所生兒子色盲機率為何？(A)0%，(B)25%，(C)50%，(D)100%。
15. 原核細胞缺乏下列何種構造？(A)DNA，(B)細胞核，(C)細胞壁，(D)細胞膜。
16. 下列何種構造只有在細胞分裂時才會出現？(A)中心粒，(B)核仁，(C)紡錘體，(D)粒線體。

\*注意：1. 考生須在「彌封答案卷」上作答。

2. 本試題紙空白部分可當稿紙使用，試題須隨答案卷繳回。

3. 考生於作答時可否使用計算機、法典、字典或其他資料或工具，以簡章之規定為準。

17. 細菌的基本結構中，具有下列哪一項胞器？(A)粒線體，(B)核仁，(C)核膜，(D)核糖體。
18. 下列何者不是血液的功能？(A)運送氣體，(B)製造血球，(C)防禦疾病，(D)運送養分。
19. 下列何構造為男性生殖系統中儲存精子供其發育成熟的地方？(A)副睪，(B)睪丸，(C)儲精囊，(D)輸精管。
20. 下列何者是飯後的生理反應？(A)腎上腺分泌腎上腺素，(B)胰臟分泌升糖素，(C)胰臟分泌胰島素，(D)血糖降低。
21. 當左心室收縮時，下列何者正確？(A)血液流入主動脈，(B)血液流入肺動脈，(C)半月瓣關閉，(D)房室瓣開啟。
22. 下列何種類型的血管在人體內分佈的總面積最大？(A)大動脈，(B)大靜脈，(C)微血管，(D)小動脈。
23. 哪個器官負責分泌膽汁？(A)心臟，(B)肝臟，(C)膽囊，(D)胰臟。
24. 若 A 型父親與 B 型母親生了 A 型女兒及 O 型兒子，下列敘述何者正確？(A) A 型父親為同型合子，(B) B 型父親為同型合子，(C) O 型孩子出線機率為 1/2，(D) A 型孩子出線機率為 1/4。
25. 醣類食物首先在哪消化？(A)大腸，(B)小腸，(C)胃，(D)口腔。
26. Which structure is common to plant and animal cells? (A) wall made of cellulose; (B) chloroplast; (C) mitochondrion; (D) central vacuole; (E) centriole.
27. What is the role of light in plants? (A) It controls growth and movement; (B) It is necessary for photosynthesis; (C) It controls the distribution of hormones; (D) All the above.
28. The rate of growth is highest in: (A) Steady state; (B) Log phase; (C) Lag phase; (D) None of the above.
29. Which of the following best describes the process of trees releasing water vapor?(A) Transpiration (B) Respiration (C) Photosynthesis (D) Condensation
30. What causes delay in germination of seeds (A) Unavailability of water and oxygen; (B) Mechanical resistance of testa; (C) Impermeability of seed coat; (D) All the above.
31. Which of the following is a scientific concern related to creating genetically modified crops? (A) Herbicide resistance may spread to weedy species. (B) Genetically modified crops cannot survive without the addition of great amounts of fertilizer to the soil. (C) The

\*注意：1. 考生須在「彌封答案卷」上作答。

2. 本試題紙空白部分可當稿紙使用，試題須隨答案卷繳回。

3. 考生於作答時可否使用計算機、法典、字典或其他資料或工具，以簡章之規定為準。

- monetary costs of growing genetically modified plants are significantly greater than traditional breeding techniques. (D) Genetically modified plants are less stable and may revert back to parental genotypes.
32. Double fertilization means that \_\_\_\_\_. (A) flowers must be pollinated twice to yield fruits and seeds; (B) one sperm is needed to fertilize the egg, and a second sperm is needed to fertilize the polar nuclei; (C) every sperm has two nuclei; (D) the egg of the embryo sac is diploid.
33. Nitrogen fixation is a process that \_\_\_\_\_. (A) recycles nitrogen compounds from dead and decaying materials; (B) converts ammonia to ammonium; (C) converts nitrogen gas into ammonia; (D) releases nitrate from the rock substrate.
34. Which of the following is the correct order of floral organs from the outside to the inside of a complete flower? (A) sepals → petals → stamens → carpels; (B) petals → sepals → stamens → carpels; (C) sepals → stamens → petals → carpels; (D) spores → gametes → zygote → embryo.
35. Ethylene effects the response to mechanical stress, including slowing the stem elongation, a thickening of the stem and a curvature that causes the stem to start growing horizontally. (A) Apical dominate; (B) De-etiolation; (C) Triple response; (D) Totipotency.
36. A plant hormone that is produced in roots and leaves in response to water deficiency, signals guard cells to close stomata. This response reduces wilting but also restricts CO<sub>2</sub> absorption, thereby slowing photosynthesis. (A) auxin; (B) abscisic acid; (C) cytokinin; (D) gibberellin; (E) ethylene.
37. Seeds evolve from the maturing \_\_\_\_\_ following pollination and fertilization. (A) carpel; (B) ovary; (C) petal; (D) stigma; (E) ovule.
38. Gymnosperms are vascular plants that produce: (A) Naked seeds; (B) Fruit (C) Protected seeds (D) Complete flowers (E) Capsules.
39. Ribosome is a biological machine that makes? (A) cell walls; (B) proteins; (C) membranes; (D) starch; (E) lipid.
40. Which one is not the reason for using biofuel? (A) reduce the greenhouse effect; (B) reduce

\*注意：1. 考生須在「彌封答案卷」上作答。

2. 本試題紙空白部分可當稿紙使用，試題須隨答案卷繳回。

3. 考生於作答時可否使用計算機、法典、字典或其他資料或工具，以簡章之規定為準。

the air pollution; (C) environmental friendly; (D) run fast.

41. Where are the molecules of the electron transport chain found in plant cells? (A) thylakoid membranes of chloroplasts; (B) outer membrane of mitochondria; (C) stroma of chloroplasts; (D) cytoplasm; (E) matrix of mitochondria.
42. A specialized plant cell that helps control the movement of sugars through sieve tubes parenchyma: (A) sieve tube member; (B) companion cell; (C) tracheid; (D) guard cell; (E) vessel element.
43. De-etiolation involves: (A) slowed stem growth; (B) chlorophyll production; (C) deeper root growth; (D) leaf expansion; (E) all are correct.
44. What type of vascular tissue is involved in the transport of large molecules? (A) Parenchyma; (B) Cambium; (C) Xylem; (D) Phloem.
45. Which tissue forms the growth rings in trees? (A) primary xylem; (B) secondary xylem; (C) cambium; (D) phloem; (E) parenchyma.

### SECTION B – Short answer questions (10%)

**Directions: Answer this section in pen. Answer all questions on the answer sheet.**

1. Briefly describe the life cycle of angiosperm. (5%)
2. Briefly describe the differences between monocot and dicot plants (5%)

\*注意：1. 考生須在「彌封答案卷」上作答。

2. 本試題紙空白部分可當稿紙使用，試題須隨答案卷繳回。

3. 考生於作答時可否使用計算機、法典、字典或其他資料或工具，以簡章之規定為準。

科目：動物及植物學

系組：生命科學系

年級：三

**SECTION A (90%)** 每題 2 分

**Directions:** Each of the questions or incomplete statements below is followed by four or five suggested answers or completions. Selection the one that is best in each case on the answer sheet.

1. 下列何種胞器與動物食泡內物質的消化最相關？(A)液胞，(B)溶體，(C)中心體，(D)核糖體。
2. 下列何者不是關於肺泡的敘述？(A)肺泡壁很薄，(B)富含微血管，(C)肺泡壁是濕潤的，(D)肺泡間有肌肉，使肺具彈性且能收縮。
3. 為何會發生突眼症？(A)生長激素分泌過多，(B)生長激素分泌過少，(C)甲狀腺分泌過多，(D)甲狀腺分泌不足。
4. 下列哪些血管含有缺氧血？(A)主動脈與肺動脈，(B)大靜脈與肺靜脈，(C)肺動脈與大靜脈，(D)肺靜脈與大動脈。
5. 在人體消化的過程中，下列何者所含的消化酶的種類最多？(A)胰液，(B)胃液，(C)唾液，(D)膽汁。
6. 製造尿液最先發生的步驟是什麼？(A)分泌作用，(B)再吸收作用，(C)過濾作用，(D)胞飲作用。
7. 下列何者非細胞膜電位形成原因？(A)各種離子在細胞內外液濃度之差異，(B)細胞內外滲透壓差，(C)鈉鉀幫浦的貢獻，(D)細胞膜對於細胞內外離子之選擇性通透。
8. 下列何者為副交感神經興奮時產生之作用？(A)心跳變快，(B)增加心臟收縮強度，(C)血管收縮，(D)心跳變慢。
9. 下列何者器官可分泌紅血球生成素？(A)肺臟，(B)心臟，(C)腎臟，(D)肝臟。
10. 下列何者不是淋巴系統的功能？(A)運送養分到細胞，(B)回收組織間液，(C)參與免疫系統，(D)防止水腫。
11. 下列何者不屬於下視丘的功能？(A)維持正常體溫，(B)調節食慾，(C)高級自律中樞，(D)抑制骨骼肌的動作。
12. 血型為 AB 型的病人是可以接受所有血型的血液，是因為血漿中：(A)同時有抗 A 型

\*注意：1. 考生須在「彌封答案卷」上作答。

2. 本試題紙空白部分可當稿紙使用，試題須隨答案卷繳回。

3. 考生於作答時可否使用計算機、法典、字典或其他資料或工具，以簡章之規定為準。

與抗 B 型的抗體，(B)缺乏抗 A 型與抗 B 型的抗體，(C)只有 A 型的抗體，(D)只有 B 型的抗體。

13. 下列何者不是關於膽汁的敘述？(A)膽汁分泌到小腸，參與脂肪分解的作用，(B)膽汁為酸性液體，有助於脂肪酶的作用，(C)含膽鹽可乳化脂肪，(D)由肝臟分泌。
14. 下列何者是免疫球蛋白中含量最多的？(A)IgG，(B)IgM，(C)IgE，(D)IgA。
15. 尿液中的尿素主要來自何種物質的代謝？(A)葡萄糖，(B)蛋白質，(C)核酸，(D)纖維素。
16. 下列何者為多核細胞？(A)神經細胞，(B)成熟的紅血球，(C)肺泡細胞(D)心肌細胞。
17. 下列哪一個荷爾蒙的合成前驅物不是膽固醇？(A)抗利尿激素(ADH)，(B)雌二醇(estradiol)，(C)睪固酮(testosterone)，(D)糖皮質酮(glucocorticoids)。
18. 白血球的細胞膜形成偽足，將細菌送入細胞內摧毀，是利用何種細胞膜的運輸方式？(A)胞吐作用(exocytosis)，(B)滲透作用(osmosis)，(C)擴散作用(diffusion)，(D)胞噬作用(phagocytosis)。
19. 粒線體內的 DNA 遺傳自何處？(A)爸爸，(B)媽媽，(C)爸爸與媽媽各半，(D)隨機。
20. 礦物質對人體正常生理機能的維持十分重要，下列有關礦物質與人體生理機能的配對，何者錯誤？(A)碘：構成甲狀腺素，(B)鈣：組成牙齒與骨骼，(C)鎂：參與肌肉收縮與血液凝固，(D)鐵：血紅素分子的組成分。
21. 下列何種化學物質可以無須任何蛋白質協助就可以自由通透過細胞膜？(A)鈉離子，(B)氨基酸，(C)蛋白質，(D)氧分子。
22. 下列何者不是細胞膜的主要成分？(A)磷脂質，(B)核糖核酸，(C)蛋白質，(D)膽固醇。
23. 請問下列何者不是胰島素的功能？(A)促進細胞攝取葡萄糖，(B)降低肝臟中肝醣的分解，(C)促進脂肪儲存，(D)以上都是。
24. 下列何種激素是由卵巢所製造釋放？(A)黃體生成素(LH)，(B)濾泡刺激素(FSH)，(C)動情素(estrogen)，(D)催產素(oxytocin)。
25. 對於白血球細胞的敘述那一個是錯的？(A)嗜鹼性細胞(basophils)的功能是放出組

\*注意：1. 考生須在「彌封答案卷」上作答。

2. 本試題紙空白部分可當稿紙使用，試題須隨答案卷繳回。

3. 考生於作答時可否使用計算機、法典、字典或其他資料或工具，以簡章之規定為準。

織胺，(B)嗜伊紅細胞(eosinophils)會殺死抗體包覆的寄生蟲，(C)單核細胞(monocyte)會發育成巨噬細胞(macrophage)，(D)T cell 會分化成產生抗體的細胞。

26. Where would you look for active cell division in plant? (A) At the tip of root and shoot; (B) In the pith cells; (C) In the internodal region; (D) In the cells of cortex.
27. The rate of growth of any organism follows: (A) J-shaped curve; (B) Sigmoid curve; (C) Hyperbola curve; (D) Parabola curve.
28. Legume seeds exhibit dormancy because of (A) Absence of gibberellic acid; (B) Absence of cytokinins; (C) Undeveloped embryos; (D) Hard seed coat.
29. Change in form and physiological activity is termed as (A) Osmosis; (B) Growth; (C) Development; (D) Differentiation.
30. The excess amount of carbon dioxide (A) Accelerates growth; (B) Affects the growth slowly; (C) Retards growth; (D) Does not affect growth.
31. Which of the following could be considered an evolutionary advantage of asexual reproduction in plants? (A) increased agricultural productivity in a rapidly changing environment; (B) increased success of progeny in a stable environment; (C) increased ability to adapt to a change in the environment; (D) maintenance and expansion of a large genome.
32. The egg of a plant has a haploid chromosome number of 10 ( $n = 10$ ). What is true about the number of chromosomes in the cells of other tissues of this plant? (A) The sperm has 5 chromosomes. (B) The leaves and stems have 10 chromosomes. (C) The zygote has 10 chromosomes. (D) The endosperm has 30 chromosomes.
33. What major benefits do plants and mycorrhizal fungi receive from their symbiotic relationship? (A) Fungi receive photosynthetic products in exchange for living in plant root nodules. (B) Plants receive increased root surface area, and fungi receive digestive enzymes. (C) Plants receive nitrogen and phosphorus, and fungi receive photosynthetic products. (D) Plants receive enzymes, and fungi receive nitrogen and phosphorus.

\*注意：1. 考生須在「彌封答案卷」上作答。

2. 本試題紙空白部分可當稿紙使用，試題須隨答案卷繳回。

3. 考生於作答時可否使用計算機、法典、字典或其他資料或工具，以簡章之規定為準。

34. Plant hormones: (A) are always synthesized in the tissue where they elicit a response; (B) serve as a signaling mechanism between plant cells, tissues, and organs. (C) are small, inorganic compounds; (D) serve as external regulators of plant growth.
35. A plant hormone which is synthesized in the shoot tip, has polar transport propriety and participates in regulating the apical dominance. (A) auxin; (B) abscisic acid; (C) cytokinin; (D) gibberellin; (E) ethylene.
36. Which phytohormone can break seed dormancy? (A) auxin; (B) abscisic acid; (C) cytokinin; (D) gibberellin; (E) ethylene.
37. Which of the following statements about abscisic acid is FALSE? (A) it is involved in leaf abscission. (B) it stimulates production of seed storage protein. (C) it is involved in the closing of the stomata in response to water stress. (D) it prevents premature seed germination.
38. A culture method that plant are grown in mineral solutions without soil. This method could be applied to identify essential elements in plant. (A) tissue culture; (B) hydroponic culture; (C) propagation culture; (D) cell culture.
39. A nondestructive biotechnology that harnesses the ability of some plants to extract soil pollutants (i.e. heavy metal) and concentrate them in portion of the plant that can be easily removed for safe disposal. (A) Gene transformation. (B) Phytoremediation. (C) Gene editing. (D) Tissue culture.
40. A living part of the cell, which also included the plasma membrane. It also could be defined as an entire cell excluding cell wall. Its cell wall completely or partially removed using either mechanical or enzymatic means. (A) Plastid. (B) Plasmid. (C) Protoplast. (D) Cytoplasma.
41. Which of the following component is NOT classified into secondary metabolite? (A) Proline; (B) Cocaine; (C) Tannins; (D) Caffeine; (E) Menthol.
42. Why are C<sub>4</sub> plants able to photosynthesize with no apparent photorespiration? (A) They

\*注意：1. 考生須在「彌封答案卷」上作答。

2. 本試題紙空白部分可當稿紙使用，試題須隨答案卷繳回。

3. 考生於作答時可否使用計算機、法典、字典或其他資料或工具，以簡章之規定為準。



use PEP carboxylase to initially fix CO<sub>2</sub>. (B) They are adapted to cold, wet climates. (C) They conserve water more efficiently. (D) They do not participate in the Calvin cycle. (E) They exclude oxygen from their tissues

43. Ribosome contains two types of biological macromolecules? (A) DNA and RNA; (B) proteins and DNA; (C) proteins and RNA; (D) proteins and carbohydrate; (E) all of them.
44. Which of the following statements best describes the relationship between photosynthesis and respiration? (A) Photosynthesis occurs only in plants and respiration occurs only in animals. (B) Respiration runs the biochemical pathways of photosynthesis in reverse. (C) Photosynthesis stores energy in complex organic molecules, whereas respiration releases it. (D) Respiration is anabolic and photosynthesis is catabolic (E) ATP molecules are produced in photosynthesis and used up in respiration.
45. Which one is incorrect? (A) By far the most prevalent solute in phloem sap is sugar, typically glucose in most species. (B) Sugars are transported from sink to source via the phloem. (C) Diffusion, active transport, and bulk flow act in concert to transport resources throughout the whole plant (D) Cavitation is more common in wide vessel elements than in tracheids and can occur during drought stress or when xylem sap freezes in winter.

### SECTION B – Short answer questions (10%)

**Directions:** Answer this section in pen. Answer all questions on the answer sheet.

1. Briefly compare the gene transformation and gene editing. (5%)
2. Briefly compare the C<sub>3</sub>, C<sub>4</sub> and CAM plants. (5%)

\*注意：1. 考生須在「彌封答案卷」上作答。

2. 本試題紙空白部分可當稿紙使用，試題須隨答案卷繳回。

3. 考生於作答時可否使用計算機、法典、字典或其他資料或工具，以簡章之規定為準。