國立高雄大學 108 學年度轉學招生考試試題(轉二年級)

科目：普通生物學
考試時間：80 分鐘
系所：
生命科學系(無組別)
本科原始成績：100 分
是否使用計算機：否

一、選擇題(每題 2 分，共 50 分)

1. 下列何者是「生物多樣性危機」最好的證據？
A) the incursion of a non-native species
B) increasing pollution levels
C) decrease in regional productivity
D) high rate of extinction
E) climate change

2. 下列何者是受全球滅絕威脅最嚴重的物種？
A) amphibians
B) birds
C) fish
D) mammals
E) plants

3. 水域生產力的最主要限制因子是？
A) pressure
B) lack of nutrients
C) light availability
D) herbivores
E) competition

4. 下列何者是警戒色(aposematic coloration)？
A) stripes of a skunk
B) eye color in humans
C) green color of a plant
D) colors of an insect-pollinated flower
E) a katydid whose wings look like a dead leaf

5. 在 20 世紀最顯著的限制人群成長的因子？
A) famine
B) non-HIV disease
C) HIV
D) genocide
E) clean water

6. 下列何者和細胞膜雙脂層的厭水層沒有一點關聯？
A) transmembrane proteins
B) integral proteins
C) peripheral proteins
D) integrins
E) glycoproteins

7. 下列何者不是骨髓系細胞？
A) neutrophils.
B) macrophages.
C) dendritic cells.
D) natural killer cells.
E) eosinophil

8. 細菌的「transformation」是指
A) the creation of a strand of DNA from an RNA molecule
B) the creation of a strand of RNA from a DNA molecule
C) the infection of cells by a phage DNA molecule
D) the type of semiconservative replication shown by DNA
E) assimilation of external DNA into a cell

9. 下列何者說明 RNA 的演化可能早於 DNA？
A) RNA polymerase uses DNA as a template
B) RNA polymerase makes a single-stranded molecule
C) RNA polymerase does not require localized unwinding of the DNA
D) DNA polymerase uses primer, usually made of RNA
E) DNA polymerase has proofreading function

10. 大部分的抑制蛋白為異位 (allosteric) 調節，下列何者可以和抑制蛋白結合而改變它的構型？
A) inducer
B) promoter
C) RNA polymerase
D) transcription factor
E) cAMP

11. 基因銘印、DNA 甲基化和組蛋白乙醯化都是一種
A) genetic mutation
B) chromosomal rearrangements
C) karyotypes
D) epigenetic phenomena
E) translocation

12. 細胞內的 RNA 分子和其互補的序列結合成雙股 RNA 而被毀損的作用稱為
A) RNA interference
B) RNA obstruction
C) RNA blocking
D) RNA targeting
E) RNA disposal

13. 下列何種技術最適合研究病毒的套膜？
A) transmission electron microscopy
B) antibodies against specific proteins not found in the host membranes
C) staining and visualization with the light microscope
D) use of plaque assays for quantitative measurement of viral titer
E) immunofluorescent tagging of capsid proteins

14. 下列何者是將蛋白質轉漬到膜上以分析基因表現？
A) Southern blotting
B) Northern blotting
C) Western blotting
D) Eastern blotting
E) RT-PCR

15.具有激素和神經傳導功能的是
A) acetylcholine
B) calcitonin
C) ecdysone
D) epinephrine
E) parathyroid hormone

16. 如何獲得基因體的實體圖譜(physical map)？
A) using recombination frequency
B) using very high-powered microscopy
C) using restriction enzyme cutting sites
D) using sequencing of nucleotides
E) using DNA fingerprinting via electrophoresis

17. 何謂「metagenomics」？
A) genomics as applied to a species that most typifies the average phenotype of its genus
B) the sequence of one or two representative genes from several species
C) the sequencing of only the most highly conserved genes in a lineage
D) genomics as applied to an entire phylum
E) sequencing DNA from a group of species from the same ecosystem

18. 如果一個古代細胞內的 rRNA 序列竟然比老鼠的更近似人類，其最好的解釋是？
A) homology
B) homoplasy
C) common ancestry
D) retro-evolution by humans
E) coevolution

19. 下列何者對黴漿菌的描述是真的？
A) They are gram-negative
B) They are subject to lysis in hypotonic conditions
C) They lack a cell membrane as well
D) They should contain less cellulose than do bacteria that possess cell walls
E) They possess typical prokaryotic flagella

20. 下列何者是革蘭氏陰性菌內毒素的重要來源？
A) endospore
B) sex pilus
C) flagellum
D) cell wall
E) capsule

21. 綠藻和陸生植物最大的不同的是，它們是（有）
A) heterotrophs
B) unicellular.
C) plastids
D) alternation of generations
E) cell walls containing cellulose

22. 孢粉素（sporopollenin）的主要功能是
A) comprise spore surface structures that catch the wind and assist in spore dispersal
B) reduce dehydration
C) make spores less dense and able to disperse more readily
D) repel toxic chemicals
E) provide nutrients to spores

23. 裸子植物和蕨類不同的是，它們是（有）
A) woody
B) macrophylls
C) pollen.
D) sporophylls
E) spores

24. 真菌分泌之可抑制細菌生長的化學物質稱為
A) antibodies
B) aflatoxins
C) hallucinogens
D) antigens
E) antibiotics

25. 動物被認為共同演化自
A) unicellular chytrid
B) unicellular yeast
C) multicellular algae
D) multicellular fungus
E) flagellated protest

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二、名詞解釋(請翻譯出中文名並解釋其意義，每題 4 分，共 32 分)

1. Operant Conditioning
2. Demography
3. Commensalism
4. Bryophytes
5. Deuterostome Development
6. Chordates
7. Phytoremediation
8. Adaptive Immunity

三、問答題(18 分，18%)

1. 寫出植物的三種組織系統和五種常見細胞類型。 (8 分，8%)
2. 寫出動物的四種主要攝食機制(Feeding Mechanism)並舉例說明。 (10 分，10%)

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單選題(每題 4 分)

1. Which of the following figure(s) represent a result having high precision?

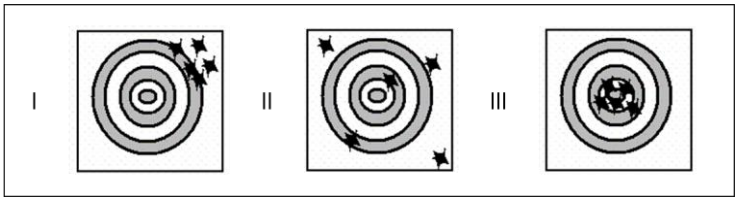
(A) Figure I only

(B) Figure II only

(C) Figure III only

(D) Figure I and Figure II

(E) Figure I and Figure III



2. You have 100.0 mL of 0.100 M aqueous solutions of each of the following acids: HCN, HF, HCl, and $HC_2H_3O_2$. You titrate each with 0.100 M $NaOH_{(aq)}$. Rank the pHs of each of the solutions when each are titrated to the equivalence point, from highest to lowest pH. (K_a for HCN is 6.2×10^{-10}, K_a for HF is 7.2×10^{-4}, K_a for $HC_2H_3O_2$ is 1.80×10^{-5}).

(A) HCN, $HC_2H_3O_2$, HF, HCl

(B) HCN, $HC_2H_3O_2$, HCl, HF

(C) $HC_2H_3O_2$, HCN, HCl, HF

(D) $HC_2H_3O_2$, HF, HCN, HCl

(E) $HC_2H_3O_2$, HF, HCl, HCN

3. You have two salts, AgX and AgY, with very similar K_{sp} values. You know that Ka for HX is much greater than Ka for HY. Which salt is more soluble in acidic solution?

(A) AgX

(B) AgY

(C) They are equally soluble in acidic solution.

(D) Cannot be determined by the information given.

(E) More information is needed to answer this.

4. A hypothetical element consists of two isotopes of masses 70.00 and 72.00 amu with abundances of 25% and 75%, respectively. What is the average atomic mass of this element?

(A) 70.50 amu

(B) 71.00 amu

(C) 71.25 amu

(D) 71.50 amu

(E) 71.75 amu

5. A scientist obtains the number 0.035006701258 on a calculator. If this number actually has four (4) significant figures, how should it be written?

(A) 0.035

(B) 0.0350

(C) 0.03501

(D) 0.035007

(E) 0.0350067

6. Which of the following should have the lowest boiling point?

(A) HF

(B) N_2

(C) NH_3

(D) H_2O

(E) Na_2S

7. For the redox reaction $2Fe^{2+} + Cl_2 \leftrightarrow 2Fe^{3+} + 2Cl^-$ which of the following observations are the correct half-reactions?

I: $Cl^2 + 2e^- \leftrightarrow 2Cl^-$ II: $Cl \leftrightarrow Cl^- + e^-$ III: $Cl_2 \leftrightarrow 2Cl^- + 2e^-$

IV: $Fe^{2+} \leftrightarrow Fe^{3+} + e^-$ V: $Fe^{2+} + e^- \leftrightarrow Fe^{3+}$

(A) I and IV

(B) I and V

(C) II and IV

(D) II and V

(E) III and IV

8. When a strontium salt is ignited, it burns with a red flame. The frequency of the light given off by this flame is greater than

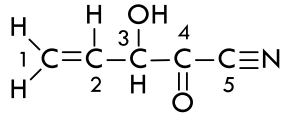
(A) X-rays

(B) ultraviolet light

(C) infrared light

(D) green light

(E) yellow light

9. Consider the molecule: 

Specify the hybridization of each carbon atom (C-1, C-2, C-3, C-4 and C-5).

(A) sp^2, sp^3, sp^2, sp^3 and sp

(B) sp^2, sp^3, sp^2, sp^3 and sp^2

(C) sp^3, sp^3, sp^2, sp^3 and sp^2

(D) sp^3, sp^3, sp^2, sp^3 and sp

(E) sp^2, sp^2, sp^3, sp^2 and sp

10. Bromine exists naturally as a mixture of Br-79 and Br-81 isotopes. An atom of Br-79 contains

(A) 34 protons and 35 electrons, only

(B) 35 protons, 79 neutrons, and 35 electrons

(C) 44 protons, 44 electrons, and 35 neutrons

(D) 35 protons, 44 neutrons, 35 electrons

(E) 79 protons, 79 electrons, and 35 neutrons

11. Which of the following is not a strong base?

(A) KOH

(B) LiOH

(C) NH_3

(D) NaOH

(E) $Sr(OH)_2$

12. $Cu_2O_{(s)} + 1/2\ O_{2(g)} \rightarrow 2\ CuO_{(s)}$ $H° = -144$ kJ $Cu_2O_{(s)} \rightarrow Cu_{(s)} + CuO_{(s)}$ $H° = +11$ kJ

Calculate the standard enthalpy of formation of CuO(s).

(A) +155 kJ

(B) –155 kJ

(C) –166 kJ

(D) +299 kJ

(E) –299 kJ

13. How many electrons are involved in *pi* bonding in benzene?

(A) 2

(B) 3

(C) 4

(D) 6

(E) 12

14. Which among the following represent a set of isotopes? Atomic nuclei containing:

I: 20 protons and 20 neutrons, II: 21 protons and 19 neutrons, III: 22 neutrons and 18 protons, IV: 20 protons and 22 neutrons, V: 21 protons and 20 neutrons

(A) I, V

(B) III, IV

(C) I, IV and II, V

(D) I, II, III

(E) No isotopes are indicated.

15. If the equilibrium constant for X + Y↔Z is 0.20, then the equilibrium constant for 2Z↔2X + 2Y is

(A) 0.04

(B) 0.40

(C) 2.50

(D) 6.25

(E) 25.0

16. For the reaction 5W + 5X → 2Y + 2Z, at a particular instant in time, the rate of the reaction is 0.0223 M/s. What is the rate of change of W?

(A) –0.112 M/s

(B) –0.0223 M/s

(C) –0.00446 M/s

(D) 0.112 M/s

(E) 0.00446 M/s

17. An ideal solution is formed from a mixture of the nonvolatile solute urea, $CO(NH_2)_2$, and methanol, CH_3OH. The vapor pressure of pure methanol at 20°C is 89 mmHg. If 4.5 g of urea is mixed with

40.0 g of methanol, calculate the vapor pressure of the methanol solution.

(A) 4.9 mmHg

(B) 15 mmHg

(C) 74 mmHg

(D) 80 mmHg

(E) 84 mmHg

18. For the elements Cs, F, and P, the order of increasing electronegativity is:

(A) Cs < P < F

(B) Cs < F < P

(C) P < F < Cs

(D) F < Cs < P

(E) P < Cs < F

19. Of the following, which molecule has the largest bond angle?

(A) H_2S

(B) HCN

(C) OF_2

(D) H_2O

(E) More than one of the above have equally large bond angles.

20. How many moles of hydrogen sulfide are contained in a 49.7 g sample of this gas?

(A) 0.69 mol

(B) 1.46 mol

(C) 2.92 mol

(D) 24.7 mol

(E) 83.8 mol

21. Which of the following groups contains no ionic compounds

(A) PCl_5, LiBr, $Zn(OH)_2$

(B) CH_2O, H_2O, NH_3

(C) KOH, CCl_4, SF_4

(D) NaH, CaF_2, $NaNH_2$

(E) HCN, NO_2, $Ca(NO_3)_2$

22. You have equal masses of different solutes dissolved in equal volumes of solution. Which of the solutes would make the solution having the highest molar concentration?

(A) LiOH

(B) NaOH

(C) KOH

(D) KCl

(E) KBr

23. Consider three 1-L flasks at STP. Flask A contains NH_3 gas, flask B contains NO_2 gas, and flask C contains N_2 gas. In which flask are the molecules least polar and therefore most ideal in behavior?

(A) Flask A

(B) Flask B

(C) Flask C

(D) All are the same.

(E) More information is needed to answer this.

24. Which of the following exhibits resonance?

(A) NH_3

(B) H_2O

(C) PCl_5

(D) O_3

(E) H_2S

25. The equilibrium constant for the reaction $NH_4^+ + OH^- \leftrightarrow NH_3 + H_2O$ is:

(A) $1/[K_b\,(NH_3)]$

(B) $1/[K_a\,(NH_4^+)]$

(C) $K_w/[K_a\,(NH_4^+)]$

(D) $K_w/[K_b\,(NH_3)]$

(E) $[K_b\,(NH_3)]/K_w$