111學年度 學士後醫學系招生考試
普通生物及生化概論試題封面
考試開始鈴響前,請勿翻閱本試題!
★考試開始鈴響前,請注意:
一、除准考證、應考文具及一般手錶外;行動電話、穿戴式裝置及其他物品
均須放在臨時置物區。
二、請務必確認行動電話已取出電池或關機,行動電話及手錶的鬧鈴功能必
須關閉。
三、就座後,不可擅自離開座位或與其他考生交談。
四、坐定後,雙手離開桌面,確認座位號碼、答案卡號碼與准考證號碼相
同,以及抽屜中、桌椅下或座位旁均無非考試必需用品。如有任何問
題,請立即舉手反應。
五、考試開始鈴響前,不得翻閱試題本或作答。
六、考試全程不得吃東西、喝水及嚼食口香糖。
七、違反上述規定,依「筆試規則及違規處理辦法」議處。
★作答説明:
一、考試時間:100分鐘。
二、本試題(含封面)共16頁,如有缺頁或毀損,應立即舉手請監試人員
補發。
三、本試題共90題,皆為單選題,共計150分;每題答錯倒扣,不作答不
<b>計分。</b>
四、答題依題號順序劃記在答案卡上,寫在試題本上無效;答案卡限用 2B
鉛筆劃記,若未按規定劃記,致電腦無法讀取者,考生自行負責。
五、試題本必須與答案卡一併繳回,不得攜出試場。

本試題(含本封面)共16頁:第1頁

Choose one best answer for the following questions

【單選題】每題1分,共計30分,答錯1題倒扣0.25分,倒扣至本大題零分為止,未 作答,不給分亦不扣分。1~15題為普通生物,16~30題為生化概論。

- 1. A root is not uniform but has distinct zones. Starting from the tip, which of the following orders of the zones is **CORRECT**?
  - (A) Apical meristem  $\rightarrow$  root cap  $\rightarrow$  zone of elongation  $\rightarrow$  zone of maturation/root hairs
  - (B) Root cap  $\rightarrow$  zone of elongation  $\rightarrow$  apical meristem  $\rightarrow$  zone of maturation/root hairs
  - (C) Root cap  $\rightarrow$  apical meristem  $\rightarrow$  zone of elongation  $\rightarrow$  zone of maturation/root hairs
  - (D) Root cap  $\rightarrow$  apical meristem  $\rightarrow$  zone of maturation/root hairs  $\rightarrow$  zone of elongation
  - (E) Root cap  $\rightarrow$  zone of elongation  $\rightarrow$  zone of maturation/root hairs  $\rightarrow$  apical meristem
- 2. Regarding gravitropism when a plant root is put horizontally, which of the following is TRUE?
  - (A) Statolith is composed of lipid.
  - (B) Statolith triggers the redistribution of calcium in root cells.
  - (C) High concentration of auxin in the lower side of root cell increases the cell elongation.
  - (D) Blue light signal is involved in gravitropism.
  - (E) Fertilizer induces the gravitropism.
- 3. Red tides are dangerous because of \_\_\_\_\_.
  - (A) the dinoflagellates that cause them produce a strong neurotoxin
  - (B) the euglenoids that cause them produce a toxin that causes severe flulike symptoms
  - (C) the green algae that cause them produce a severe allergic reaction in most people
  - (D) the diatoms that cause them produce severe gastric distress
  - (E) the red algae that cause them can disrupt shipping by clogging propellers
- 4. A torpor for animals to survive long period of high temperature and water scarcity can be called as .
  - (A) hibernation (B) estivation (C) thermoregulation
  - (D) acclimatization (E) adaptation
- 5. Which stage of human cell mitotic division begins the separation of sister chromatids?
  - (A) Interphase (B) Prophase (C) Prometaphase
  - (D) Metaphase (E) Anaphase
- 6. In a cell, the function of which organelle is corrected with "Breakdown"?
  - (A) Rough endoplasmic reticulum (B) Smooth en
  - (C) Peroxisomes
- (B) Smooth endoplasmic reticulum

(E) Extracellular matrix

(D) Mitochondria

- Two species of lizards live in close proximity and feed on insects and arthropods. They prefer distinctly different niches. This phenomenon is \_\_\_\_\_.
  - (A) resource partitioning
  - (B) competitive exclusion
  - (C) allopatric competition
  - (D) sympatric competition
  - (E) sympatric competition and allopatric competition
- 8. \_\_\_\_\_ is also as club fungus.
  - (A) Ascomycetes (B) Basidiomycetes
- (C) Mucoromycetes
- (D) Chytrids (E) Zoopagomycetes
- 9. The scientific name of a species consists of \_\_\_\_\_.
  - (A) a minimum of three descriptive adjectives
  - (B) the capitalized family name and genus name
  - (C) the capitalized phylum name and a specific epithet
  - (D) the capitalized genus name and a specific epithet
  - (E) the capitalized species name and subspecies name
- 10. In the human renal system, \_\_\_\_\_\_ ion (or molecule) concentration in the blood is regulated by secretion into the distal tubule.
  - (A)  $Na^+$  (B)  $K^+$  (C)  $Cl^-$  (D)  $HCO_3^-$  (E)  $H_2O$
- 11. Based on the Human Genome Project (HGP), which category of regions exists the smallest amount of our total DNA?
  - (A) Repetitive DNA that includes transposable elements and related sequences
  - (B) Repetitive DNA unrelated to transposable elements
  - (C) Unique noncoding DNA
  - (D) Exons that include regions of genes coding for proteins
  - (E) Introns and regulatory sequences
- 12. The primary reason that polar regions are cooler than the equator is that \_\_\_\_\_.
  - (A) the polar atmosphere is thinner and contains less greenhouse gases than the rest of the atmosphere
  - (B) the poles are always pointing away from the sun
  - (C) solar radiation strikes the poles at a lower angle and travels through more atmosphere
  - (D) the poles are farther from the sun than is the equator
  - (E) all of the above

- 13. Which one of the following statements is **FALSE** about temperate phage?
  - (A) Bacteriophages can undergo lytic pathway in their life cycle.
  - (B) Phage DNA is incorporated into the bacterial chromosomes.
  - (C) Certain prophage gene expression causes host bacteria pathogenic.
  - (D)  $\lambda$  phage is a temperate phage.
  - (E) Temperate phage never destroys host cells.
- 14. The hypothesis of endosymbiosis proposes that which kind of organelles in human cells were formerly small prokaryotes?
  - (A) Nucleus (B) Mitochondria
  - (C) Lysosome (D) Golgi apparatus
  - (E) Rough endoplasmic reticulum

15. In the human digestive system, which tissue (or organ) does NOT exist in exocrine glands?

- (A) Salivary glands (B) Stomach (C) Gallbladder
- (D) Liver (E) Small intestine
- 16. What following pairs have the lowest dissociation constant?
  - (A) Enzyme and substrate (B) Typical receptor and ligand interaction
  - (C) Antibody and antigen (D) Sequence-specific protein and DNA
  - (E) Biotin and avidin

17. What difference(s) is there between cellulose and chitin?

- (A) N-acetyl moiety (B)  $\alpha 1 \rightarrow 4$  and  $\beta 1 \rightarrow 4$  linkages
- (C)  $\alpha 1 \rightarrow 4$  and  $\alpha 1 \rightarrow 3$  linkages (D) Galactose and glucose moiety
- (E)  $\alpha 1 \rightarrow 4$  and  $\alpha 1 \rightarrow 6$  linkages

### 18. What is the precursor of long-chain fatty acids?

- (A) Linoleate (B) α-Linolenate (C) Oleate
- (D) Stearate (E) Palmitate
- 19. Which amino acid side chain has the highest pKa?
  - (A) Arginine (B) Cysteine (C) Histidine (D) Lysine (E) Tyrosine

### 20. What statement for cell cycle is FALSE?

- (A) G0: reentry point
- (B) G1 phase: RNA and protein synthesis. No DNA synthesis.
- (C) S phase: DNA synthesized doubles
- (D) G2 phase: DNA and protein synthesis continue
- (E) M phase: mitosis

21. In the pairs of precursor/product, which is **FALSE**? (A) acetyl-CoA/fatty acid (B) isopentenyl diphosphate/cholesterol glutamine/purines (C) (D) arginine/pyrimidine **(E)** dihydroxyacetone phosphate/triacylglycerol 22. Which of the following coenzymes is required for methionine synthase? (A) methylcobalamin (B) pyridoxal phosphate (C) tetrahydrofolic acid S-adenosylmethionine (E) NADH (D) 23. Which of the following is located in mitochondria intermembrane space? (A) complex II (B) coenzyme Q (C) complex III (D) cytochrome C (E) complex IV 24. Which of the following polysaccharides contains sulfate groups? (A) heparin **(B)** hvaluronic acid (C) peptidoglycan None of the above (D) chitin (E) 25. In humans, uric acid is an end product in the metabolism of (A) Amino acids **(B)** Phospholipids (C) Purines (D) Pyrimidines Cholesterol **(E)** 26. Which of the following statements about miRNAs and siRNAs is FALSE? (A) miRNAs can block the translation of mRNA. (B) miRNAs is a non-coding RNA. (C) miRNAs and siRNAs promote mRNA degradation. RNA polymerase II regulates the expression of miRNA gene. (D) Drosha is involved in the processing of miRNAs and siRNAs (E) 27. In aerobic state, the reaction of glycolysis (one molecule of glucose) produces (A) two molecules of pyruvate, four molecules of ATP, and two molecules NADH miRNAs can block the translation of mRNA (B) two molecules of pyruvate, two molecules of ATP, and four molecules NADH two molecules of pyruvate, two molecules of ATP, and three molecules NAD<sup>+</sup> (C) (D) two molecules of pyruvate, two molecules of ATP, and two molecules NADH two molecules of pyruvate, two molecules of ATP, and two molecules NAD<sup>+</sup> (E)

- 28. Spike (S) is a glycoprotein found on the surface of coronaviruses. S protein has 1273 residues in SARS-CoV-2 and has a molecular weight of 180–200 kDa. Based on the above information, we know that \_\_\_\_\_\_.
  - (A) the SARS-CoV-2 has a genome of 29,881 bp in length
  - (B) the expressed S protein from E. coli would have a molecular weight around 140 kDa
  - (C) S protein is a dimmer
  - (D) S protein binds to the host cell by recognizing the receptor ACE2
  - (E) S protein plays a key role in cell membrane fusion process
- 29. Which of the following pairs about the accumulated molecules and metabolic disorder is **NOT** correct?
  - (A) Homogentisate Alkaptonuria
  - (B) Tyrosine Phenylketouria
  - (C) Homocysteine Homocystinuria
  - (D) Branched-chain  $\alpha$ -keto acids Maple syrup urine disease
  - (E) Uric acid Gout

30. The following statements about DNA replication is *E. coli* are correct *except*:

- (A) Both leading strand and lagging strand require primer.
- (B) DNA polymerase adds a new nucleotide to the free 3'OH of the existing nucleic acid.
- (C) The principal replication enzyme is DNA polymerase I.
- (D) It also has a  $3^{2} \rightarrow 5^{2}$  exonuclease activity.
- (E) It is a processive enzyme.

### 【單選題】每題2分,共計120分,答錯1題倒扣0.5分,倒扣至本大題零分為止,未 作答,不給分亦不扣分。31~60題為普通生物,61~90題為生化概論。

- 31. Based on the biological species concept, reproductive isolation is a key factor of speciation. Which of the following is **NOT** a "prezygotic reproductive barrier"?
  - (A) Habitat isolation (B) Mechanical isolation (C) Hybrid breakdown
  - (D) Behavioral isolation (E) Temporal isolation

#### 32. The virus causes COVID-19 disease. This virus is \_\_\_\_\_

- (A) double-strand DNA virus
- (B) single-strand RNA virus
- (C) single-strand DNA virus
- (D) similar to  $\lambda$  phage

(E) naked RNA virus

普通生物及生化概論試題

- 33. Which of the following creatures will be the best outgroup if you are reconstructing a phylogenetic tree of cats using cladistics?
  - (A) domestic cats (B) leopards (C) lions
  - (D) tigers (E) wolves

34. Which of the following is the best description about CRISPR?

- (A) CRISPR is directed to its target gene by a guide DNA molecule.
- (B) CRISPR contains nuclease to destroy target RNA.
- (C) CRISPR is not acquired but is preexisted in bacteria.
- (D) CRISPR can be applied to knockout target gene.
- (E) All of the above are correct.

35. Which of the following does NOT match with its function?

- (A) Chlorophyll a: Component of P700 reaction center
- (B) ATP synthase: Chemiosmotic phosphorylation
- (C) Cyclic electron transport: Electron flow from water to NADPH
- (D) RuBP: Conjugates carbon dioxide
- (E) Carotenoids: Absorption of excess light
- 36. Which of the following is TRUE?
  - (A) The contents of the phloem are under pressure, and the contents of the xylem are under tension.
  - (B) Sieve tube members are dead cells.
  - (C) Vessel element protoplasm is unique because the vacuolar membrane disintegrates, allowing vacuolar water to mix with the cytosol.
  - (D) Phloem sap movement is driven by the atmospheric water potential.
  - (E) Phloem sap moves only short distances, whereas xylem sap moves long distances.
- 37. If a normal body cell of a plant contains 5 picograms (pg) of DNA, then that cell at the end of prophase of mitosis contains \_\_\_\_\_.
  - (A) 2.5 picograms (B) 5 picograms (C) 10 picograms
  - (D) 15 picograms (E) 20 picograms
- 38. In a smooth blood vessel, what is the relationship between blood pressure and the velocity of blood flow?
  - (A) When blood pressure is low, velocity is high.
  - (B) When blood pressure is low, velocity is low.
  - (C) When blood pressure is high, velocity is low.
  - (D) Velocity is always constant while blood pressure varies.
  - (E) Blood pressure is always constant while velocity varies.

- 39. Which of the following statements is **FALSE** about the comparisons of Gram-positive and Gramnegative bacteria?
  - (A) Gram-positive bacteria have thicker peptidoglycan in their cell wall.
  - (B) Gram-positive bacteria show less resistant to antibiotics.
  - (C) Gram-negative bacteria contain endotoxin whereas Gram-positive bacteria not.
  - (D) Gram-positive bacteria consist of abundant lipopolysaccharides within cell wall.
  - (E) All of the above
- 40. The inner mitochondrial membranes in liver cells have roughly five times the surface area of the outer mitochondrial membranes, allowing for faster rates of which process below?
  - (A) glycolysis
  - (B) citric acid cycle
  - (C) substrate-based phosphorylation
  - (D) oxidative phosphorylation
  - (E)  $\beta$ -oxidation
- 41. What is/are the functions of 5' cap in the eukaryotic mRNA?
  - (A) facilitate the export of mRNA from nucleus
  - (B) prevent from hydrolytic enzyme digestion
  - (C) mediate the ribosome attachment to mRNA
  - (D) B+C
  - (E) A+B+C
- 42. Which step of a basidiomycete's life cycle would be interrupted if an enzyme that blocked hyphae fusion was introduced?
  - (A) germination (B) fertilization (C) plasmogamy
  - (D) karyogamy (E) meiosis
- 43. Which statement describing the blood flow through the circulation of healthy human cardiovascular system is **TRUE**?
  - (A) Left ventricle  $\rightarrow$  Left atrium  $\rightarrow$  Pulmonary vein  $\rightarrow$  Capillaries of lungs
  - (B) Right atrium  $\rightarrow$  Right ventricle  $\rightarrow$  Left ventricle  $\rightarrow$  Left atrium
  - (C) Capillaries of abdominal regions and legs  $\rightarrow$  Aorta  $\rightarrow$  Left atrium  $\rightarrow$  Left ventricle
  - (D) Capillaries of head and arms  $\rightarrow$  Superior vena cava  $\rightarrow$  Right atrium  $\rightarrow$  Right ventricle
  - (E) Inferior vena cava  $\rightarrow$  Right ventricle  $\rightarrow$  Right atrium  $\rightarrow$ Pulmonary artery
- 44. Which kind of neurotransmitters does **NOT** belong to biogenic amines?
  - (A) Acetylcholine (B) Dopamine (C) Epinephrine
  - (D) Norepinephrine (E) Serotonin

45. Which	of following does NOT b	elong	to "Innate immunity"?		
(A)	Mucus membranes	(B)	Skin	(C)	Nostril hairs
(D)	Natural killer cells	(E)	Lymphocytes		
46. Which	h kind of hormone (or neu	rotran	smitter) is involved in reg	ulatio	n of circadian rhythm in
human	1?				
(A)	Melanin	(B)	Oxytocin	(C)	Melatonin
(D)	Acetylcholine	(E)	Dopamine		
47. What i	is the plant hormone which	is pro	duced in roots and promot	es the	attraction of
mycor	rhizal fungi to the roots?				
(A)	brassinosteroids	(B)	jasmonates	(C)	strigolactones
(D)	abscisic acid	(E)	gibberellins		
48. Which	of the following hormone	s does	NOT match the response	it elici	ts?
(A)	Salicylic acid: Resistance	e of pl	ants to some pathogens		
(B)	Ethylene: Fruit abscissio	n			
(C)	Auxin: Apical dominanc	e			
(D)	Brassinosteroids: Leaf m	orpho	genesis		
(E)	Abscisic acid: Release of	fseeds	from dormancy		
49. Which	phylum is characterized b	y anin	hals that have a segmented	body?	,
(A)	Platyhelminthes	(B)	Arthropoda	(C)	Mollusca
(D)	Cnidaria	(E)	Porifera		
50. Some	evolutionary changes can	occur	when the conditions for H	ardy-V	Weinberg equilibrium are
not me	et. Which of the following	match	es is FALSE?	-	
(A)	Adaptive evolution: No	natural	selection		
(B)	Genetic drift: No gene fl	ow			
(C)	Founder effect: Extreme	v lara	1		
	rounder enter. Extreme	ly larg	e population size		
(D)	Stabilizing selection: No	natura	e population size		
(D) (E)	Stabilizing selection: No Sexual dimorphism: Ran	natura dom n	e population size al selection nating		
(D) (E) 51. Which	Stabilizing selection: No Sexual dimorphism: Ran	natura dom n on is <b>I</b>	e population size al selection nating FALSE?		
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(D) (E) 51. Which (A) (B) (C) (D) (E)	Stabilizing selection: No Sexual dimorphism: Ran description about speciati Speciation can occur rap Speciation can not be dri A species may originate Species can take place w Divergence of allopatric	natura dom n on is <b>H</b> idly. ven by from p ithout popula	e population size al selection nating FALSE? y few genes. polyploidy. geographic separation. ation can lead to reproduct	ive iso	lation.

普通生物及生化概論試題

- 52. Flower color in sweet peas is controlled by two genes, *C/c* and *E/e*. *C* is dominant to *c* and *E* is dominant to *e*. A plant produces purple flowers only if it contains at least one dominant allele for each gene; otherwise it produces white flowers. If two plants heterozygous for both genes are crossed, what will be the phenotypic ratio for purple: white flowers?
  - (A) 3:1 (B) 4:1 (C) 9:7 (D) 5:3 (E) 15:1
- 53. A person with an extra copy of what number of chromosome has a condition called "Down syndrome"
  - (A) Chromosome 9 (B) Chromosome 13 (C) Chromosome 18
  - (D) Chromosome 21 (E) Chromosome X
- 54. Regarding damage to the AV node of heart, what type of wave can cause an Electrocardiography (ECG) ?
  - (A) The absence of the T wave
- (B) The absence of the P wave

(D) Multiple T waves

- (C) Multiple Q waves
- (E) Multiple P waves
- 55. If the mitochondria were removed from a cell, which of the following would **NOT** immediately stop?
  - (A) Glycolysis
  - (B) The citric acid cycle
  - (C) Thermogenic respiration
  - (D) Oxidative phosphorylation in the electron transport chain of respiration
  - (E) Malate-aspartate shuttle
- 56. About phytochrome, which statement is FALSE?
  - (A) Red light can lead to the production of Pfr for activating the subsequent flower gene in long-day plant.
  - (B) Pfr and Pr are the proteins with the same amino acid sequence.
  - (C) The Pr can be abundantly found in leaves.
  - (D) In theory, phytochrome contains only one gene that can express one protein.
  - (E) The flowering response induced by a short flash of light can be also converted by a short darkness in a black box.
- 57. In the bundle sheath cells of C4 plants, CO<sub>2</sub> can be fixed by \_\_\_\_\_ and produce \_\_\_\_\_ during the dark reaction of photosynthesis.
  - (A) oxaloacetatic acid (OAA), malate
  - (C) pyruvate, malate
  - (E) RuBP, 3-Phosphoglycerate
- (B) OAA, phosphoenolpyruvate (PEP)
- (D) PEP, malate

- 58. The best description or link about the concept of plant "hypersensitive response" defense system could be that \_\_\_\_\_.
  - (A) the infected cell will produce restriction enzymes to digest virus
  - (B) the infected cell will produce antibody to restrict virus
  - (C) plants can induce a broad area of cell death surrounding the infected cell
  - (D) plants can produce volatile attractant to recruit the parasitoid predator
  - (E) plants can increase vascular system to remove pathogen more quickly
- 59. In additional to the potential of many cancer cells to grow uncontrollably, which of the following scenarios is most likely to result in a tumor?
  - (A) Lack of appropriate cell death
  - (B) The order of cell cycle stages can be changed
  - (C) Inability to form spindles
  - (D) Failure of cells to enter the S shape
  - (E) Most cancer cells are senescent
- 60. In human bodies, which functional area is mainly located in the occipital lobe of the brain?

	(A)	Hearing	(B)	Reading	(C)	Smell	(D)	Speech	(E)	Vision
61.	What a	mino acid is	often p	ohosphorylate	d by a	ctive insuli	n recept	or?		
	(A)	Serine	(B)	Threonine	(C)	Tyrosine	(D)	Histidine	(E)	Arginine
62	Whata	ompound off	are the	ana aarban i	mit to	meduco N5	N110 m	athulana tatra	hudrot	Foloto in on

62. What compound offers the one-carbon unit to produce N<sup>5</sup>, N<sup>10</sup>-methylene tetrahydrofolate in one carbon metabolism?

- (A) Methionine (B) Serine (C) S-Adenosyl methionine
- (D) Choline (E) Glycine

63. What enzyme(s) is required for the cleavage of the unmethylated strand during the mismatched repair?

- (A) MutL (B) MutH
- (C) MutS (D) DNA helicase II/exonuclease VII
- (E) Exonuclease I/exonuclease X
- 64. What domain(s) of regulatory proteins for gene regulation is involved in dimerization?
  - (A) Helix-turn-helix (B) Helix-loop-helix (C) Zinc finger
  - (D) Homeodomain (E) All of the above

普通生物及生化概論試題

- 65. Which statement for hemoglobin (the oxygen-binding protein in red blood cells) is FALSE?
  - (A) Hemoglobin exists in T and R states and R state prefers to bind oxygen.
  - (B) Oxygen binding converts hemoglobin from T to R state.
  - (C) Oxygen binding to hemoglobin is both allosteric and cooperative.
  - (D) Hemoglobin also binds  $H^+$  and  $CO_2$  to lessen the affinity for  $O_2$ .
  - (E) Oxygen binding is also regulated by 2,3-bisphosphoglycerate, which stabilizes R state.

66. For treatment of AIDS, which is **NOT** a target for the approved drugs?

- (A) CD4 (B) reverse transcriptase (C) neuraminidase
- (D) protease (E) integrase

67. Which of the following receptors and their types does **NOT** match?

- (A) Insulin receptor is a G-protein-coupled receptor.
- (B) Epidermal growth factor receptor is a receptor tyrosine kinase.
- (C) Acetylcholine receptor is a gated ion channel.
- (D) Integrin receptor is an adhesion receptor.
- (E) Steroid receptor is a nuclear receptor.
- 68. Which of the following compounds has the highest (the most negative) standard free energy of hydrolysis?
  - (A) ATP (to ADP) (B) ADP (to AMP)
  - (C) AMP (to adenosine) (D) Glucose 6-phosphate (to glucose)
  - (E) Acetyl-CoA (to acetate)
- 69. Which of the following enzymatic cofactors and enzymes is **NOT** matched?
  - (A) Biotin for pyruvate carboxylase
  - (B) NAD<sup>+</sup> for glucose 6-phosphate dehydrogenase
  - (C) Pyridoxal phosphate (PLP) for aminotransferases
  - (D) Thiamine pyrophosphate (TPP) for pyruvate decarboxylase
  - (E) Vitamin B12 for methylmalonyl-CoA mutase

70. How many ATP can be net produced in a 14-carbon fatty acid degradation to CO<sub>2</sub> and H<sub>2</sub>O?

(A)	88	(B) 92	(C) 94	(D) 96	(E)	98
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71. Fatty acids are carboxylic acids with hydrocarbon chains ranging from \_\_\_\_\_ carbons long. (A) 12 to 24 (B) 4 to 36 (C) 6 to 24 (D) 6 to 36 (E) 12 to 32

- 72. The molecular weight of Protein A (pI = 4.0), B (pI = 6.8), and C (pI = 8.5) is 14 kDa, 24 kDa, and 30 kDa, respectively. All of them are monomer proteins. Which of the following statements is **CORRECT**?
  - (A) Protein A elutes out first, when you use gel filtration column to separate the mixture of those three proteins.
  - (B) Protein C is the one that moves fastest, when you separate the mixture of those three proteins by SDS-PAGE.
  - (C) As shown in the right figure, you can use this isoelectric focusing apparatus to separate those three proteins.



- (D) When you use a DEAE ion exchange column and 10 mM Tris-Cl, pH 7.0 buffer to separate these three proteins, Protein A will be bound by this column.
- (E) None of the above

73. Which of the following is NOT related to RNA-RNA interaction?

- (A) guide RNA (B) Wobble
- (C) Shine-Dalgarno sequence (D) snRNA
- (E) None of the above

74. (1) Arg; (2) Asp; (3) Gly; (4) Cys; (5) His; (6) Ser; (7) Thr. Which of the followings does **NOT** appear in the preceding seven amino acid residues?

- (A) The amino acid residue in zinc finger to coordinate zinc atom
- (B) The amino acid residue in O-link glycoprotein to link protein and oligosaccharide
- (C) The amino acid residue in Type I topoisomerase to act as a nucleophile to cut DNA
- (D) The amino acid residue in terminal proteins of adenovirus to link nucleotides and protein
- (E) None of the above
- 75. Which of the following compounds is the substrate of ribonucleotide reductase?
  - (A) AMP (B) TDP (C) GTP (D) CDP (E) dAMP

76. (1) Ribozyme; (2) Okazaki fragment; (3) DNA polymerase needs an RNA primer but RNA polymerase doesn't; (4) *de novo* biosynthesis of purine and pyrimidine; (5) retrovirus; (6) thermostable DNA polymerase. How many of the preceding items support the hypothesis that RNA appears before DNA?

(A) 2 (B) 3 (C) 4 (D) 5 (E) 6

- 77. (1) release of acetyl-CoA; (2) release of CO<sub>2</sub>; (3) release of NADH. Pyruvate dehydrogenase can convert pyruvate into acetyl-CoA, NADH, and CO<sub>2</sub>. What is its reaction order of preceding three steps?
  - (A)  $(1) \rightarrow (2) \rightarrow (3)$ (B)  $(1) \rightarrow (3) \rightarrow (2)$ (C)  $(2) \rightarrow (1) \rightarrow (3)$ (D)  $(2) \rightarrow (3) \rightarrow (1)$ (E)  $(3) \rightarrow (1) \rightarrow (2)$

78. Xeroderma pigmentosum is caused by a defect in which DNA repair pathway.

- (A) Repair of oxidative damage (B) Daughter-strand gap repair
- (C) Base excision repair (D) Mismatch repair
- (E) Nucleotide excision repair
- 79. The reverse transcriptases possess the function of ① RNA-directed DNA polymerase activity
  ② Primase ③ DNA-directed DNA polymerase activity ④ RNase H activity ⑤ Helicase
  (A) ①②③ (B) ①②④ (C) ①②⑤ (D) ①③④ (E) ①③⑤
- 80. Which of the following statements about the catabolism of free pyrimidines in the human body is CORRECT? ① Free cytosine and uracil are not salvaged ② Degradation of free cytosine produces β-alanine, CO<sub>2</sub>, and NH<sub>4</sub><sup>+</sup> ③ Degradation of free uridine produces β-aminoisobutyric acid, CO<sub>2</sub>, and NH<sub>4</sub><sup>+</sup> ④ Free thymine are recycled for synthesizing nucleosides
  (A) ①②③ (B) ①②④ (C) ①② (D) ①③ (E) ①③④
- 81. Which of the following statements about allosteric regulation is **TRUE**?
  - (A) An allosteric inhibitor of an enzyme can be a competitive inhibitor.
  - (B) An allosteric activator of an enzyme may reduce the apparent Vmax.
  - (C) An allosteric activator cannot be substrate of allosteric enzymes.
  - (D) An allosteric activator reduces the apparent Km.
  - (E) An allosteric effector is a transition state analogue.
- 82. Which of the following products are produced by the  $\beta$ -oxidation of fatty acid? ① FADH<sub>2</sub> ② NAD<sup>+</sup> ③ NADH ④ NADPH ⑤Acetyl-CoA
  - (A) 125 (B) 135 (C) 145 (D) 235 (E) 245
- 83. Lesch-Nyhan Syndrome is due to a deficient in \_\_\_\_\_ activity.
  - (A) Adenosine deaminase
  - (B) Adenine phosphoribosyltransferase
  - (C) Guanine deaminase
  - (D) Hypoxathine-guanine phosphoribosyltransferase
  - (E) AMP deaminase

- 84. Eukaryotic mRNAs may be modified after synthesis via the following reactions *except*:
  - (A) Remove noncoding regions (introns) and joining the coding regions (exon) by spliceosome
  - (B) Self-splicing of mitochondrial or chloroplast mRNA
  - (C) Cleavage at the 3' end of the primary transcript
  - (D) Addition of a string A residues at the 3' end
  - (E) Addition of a methyl-cytosine residue at the 5' end
- 85. An enzyme is found that catalyzes the reaction  $S \rightarrow P$ . Researchers find that the  $K_m$  for the substrate S is 4  $\mu$ M, and the  $k_{cat}$  is 20 min<sup>-1</sup>. In an experiment, [S]=6 mM, and V<sub>o</sub>=480 nM min<sup>-1</sup>. What was the enzyme concentration [E<sub>t</sub>] used in the experiment?

 $(A) \quad 24 \ nM \qquad (B) \quad 24 \ \mu M \qquad (C) \quad 120 \ nM \qquad (D) \quad 120 \ \mu M \qquad (E) \quad 80 \ nM$ 

- 86. Which pair of enzymes is involved in glycolysis but NOT in gluconeogenesis?
  - (A) Hexokinase and phosphohexose isomerase
  - (B) Phosphofructokinase and pyruvate kinase
  - (C) Phosphofructokinase and phosphoglycerate kinase
  - (D) Phosphoglycerate kinase and pyruvate kinase
  - (E) Phosphoglycerate mutase and enolase

87. Amino acids can be classified into different groups based on the R-group structure. Which class of amino acids contains only nonessential amino acids?

- (A) Hydrophobic (B) Aromatic
- (C) Polar, uncharged (D) Positively charged
- (E) Negatively charged
- 88. The functions of cholesterol include all the following *except*:
  - (A) A precursor of bile
  - (B) A precursor of vitamin D
  - (C) As an intracellular energy source
  - (D) Sustain cell membrane structure
  - (E) Essential for producing steroid hormone

- 89. The following statements about lipid transport are all correct *except*:
  - (A) Dietary triacylglycerols and cholesterol from intestine is carried by chylomicrons to muscle and adipose tissues.
  - (B) VLDL carries triacylglycerols and cholesterol from liver to muscle and adipose tissues.
  - (C) LDL carries mainly triacylglycerol from liver to muscle and adipose tissues.
  - (D) HDL synthesized from liver picks up cholesterol in the bloodstream and transported back to liver.
  - (E) The loss of triacylglycerols converts VLDL to LDL.
- 90. Which of the following posttranslational modifications is applied to produce active insulin molecules in pancreatic  $\beta$  cells:
  - ① Phosphorylation of Ser residues
  - ② Glycosylation of Asn residues
  - ③ Cleavage of a signal sequence
  - ④ Proteolytic cleavage of internal sequences
  - (5) Formation of disulfide bonds

(A)	345	(B)	234	(C)	25	(D)	1245	(E)	(1)2)(3)	)(5)
(11)				$(\mathbf{C})$		(D)			UU	Q

### 後醫-英文

題號	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20
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題號	41	42	43	44	45	46	47	48	49	50										
答案	А	С	Е	В	D	С	В	Е	Е	А										

### 後醫-物理及化學

題號	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20
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答案	А	В	Е	А	В	Е	А	Е	D	С	D	D	С	С	D	Е	В	С	D	С
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答案	А	В	В	D	В	В	А	С	С	А										

### 後醫-普通生物及生化概論

題號	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20
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答案	С	В	В	В	E	С	Α	В	В	В	В	D	E	С	D	С	С	E	D	С
題號	81	82	83	84	85	86	87	88	89	90										
答案	D	В	D	E	Α	В	E	С	С	A										

後醫-計算機概論與程式設計

題號	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20
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答案	Α	В	В	В	Α	Α	В	E	В	С										