考試日期:107年3月9日第→節

本試題共 5 頁 (本頁為第 / 頁)

科目:普通生物学(一)系所組:生命科学学

(一)、單選題 (60%)

- 1. ECM (Extracellular matrix) proteins are made by ribosomes in which part of a eukaryotic cell?
- (A) cytoplasm (B) nuclear envelope (C) Golgi apparatus (D) rough ER.
- 2. What is the function of the nuclear pore complex found in eukaryotes?
- (A) It regulates the movement of proteins and RNAs into and out of the nucleus.
- (B) It synthesizes the proteins required to copy DNA and make mRNA.
- (C) It synthesizes secreted proteins.
- (D) It assembles ribosomes from raw materials that are synthesized in the nucleus.
- 3. A cell with a predominance of rough endoplasmic reticulum is most likely
- (A) producing large quantities of proteins for secretion
- (B) producing large quantities of proteins in the cytosol
- (C) producing large quantities of carbohydrates to assemble an extensive cell wall matrix
- (D) producing large quantities of carbohydrates for storage in the vacuole
- 4. A cell with a predominance of smooth endoplasmic reticulum is likely specialized to
- (A) store large quantities of water
- (B) import and export large quantities of protein
- (C) actively secrete large quantities of protein
- (D) synthesize large quantities of lipids
- 5. The liver is involved in detoxification of many poisons and drugs. Which of the following structures is primarily involved in this process and, therefore, abundant in liver cells?
- (A) rough endoplasmic reticulum
- (B) smooth endoplasmic reticulum
- (C) Golgi apparatus
- (D) nuclear envelope
- 6. Which of the following organelles produces and modifies polysaccharides that will be secreted?
- (A) lysosome (B) mitochondrion (C) Golgi apparatus (D) peroxisome
- 7. Asbestos is a material that was once used extensively in construction. One risk from working in a building that contains asbestos is the development of asbestosis caused by the inhalation of asbestos fibers. Cells will take up asbestos by phagocytosis, but are not able to degrade it. As a result, asbestos fibers accumulate in ______.

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- 2.本試題紙空白部份可當稿紙使用。
- 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。

考試日期:107年3月9日第 ≥ 節

本試題共 5 頁 (本頁為第 二頁)

科目:普通生物学(一)

系所組: 生命科斯子

- (A) the Golgi apparatus (B) nuclei (C) peroxisomes (D) lysosomes
- 8. If plant cells are grown on media containing radioactively labeled thymine for one generation, radioactively labeled macromolecules will be detected in which of the following?
- (A) only in the nucleus
- (B) only in the nucleus and mitochondria
- (C) only in the nucleus and chloroplasts
- (D) in the nucleus, mitochondria, and chloroplasts
- 9. Suppose a young boy is always tired and fatigued, suffering from a metabolic disease. Which of the following organelles is most likely malfunctioning in this disease?
- (A) lysosomes (B) Golgi apparatus (C) mitochondria (D) smooth endoplasmic reticulum
- 10. Vinblastine, a drug that inhibits microtubule polymerization, is used to treat some forms of cancer. Cancer cells given vinblastine would be unable to
- (A) form cleavage furrows during cell division
- (B) migrate by amoeboid movement
- (C) separate chromosomes during cell division
- (D) maintain the shape of the nucleus
- 11. A defect in which of the following intercellular junctions would allow partially digested material to leak passively between the cells of the small intestine into the abdominal cavity?
- (A) desmosomes (B) gap junctions (C) plasmodesmata (D) tight junctions
- 12. The membranes of winter wheat are able to remain fluid when it is extremely cold by ____
- (A) increasing the proportion of unsaturated phospholipids in the membrane
- (B) decreasing the percentage of cholesterol molecules in the membrane
- (C) decreasing the number of hydrophobic proteins in the membrane
- (D) increasing the proportion of glycolipids in the membrane
- 13. Which of the following statements correctly describes osmosis?
- (A) Osmosis only takes place in red blood cells.
- (B) Osmosis is an energy-demanding or "active" process.
- (C) In osmosis, water moves across a membrane from areas of lower solute concentration to areas of higher solute concentration.
- (D) In osmosis, solutes move across a membrane from areas of lower water concentration to areas of
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考試日期:107年3月9日第一節

本試題共 5 頁 (本頁為第 3 頁)

科目:普通生物学(一)

系所組: 生命科學系

higher water concentration.

- 14. Which of the following activities would be inhibited by a drug that specifically blocks the addition of phosphate groups to proteins?
- (A) binding of G proteins to G protein-coupled receptors
- (B) ligand-gated ion channel signaling pathways
- (C) adenylyl cyclase activity
- (D) receptor tyrosine kinase activity
- 15. What is a primary function of transcription factors?
- (A) They regulate the synthesis of DNA in response to a signal.
- (B) They convert ATP into cAMP.
- (C) They control gene expression.
- (D) They regulate the release of calcium from the endoplasmic reticulum.
- 16. When we see chiasmata under a microscope, that lets us know which of the following has occurred?
- (A) asexual reproduction (B) meiosis II (C) anaphase II (D) prophase I of meiosis I
- (E) separation of homologus
- 17. Caffeine is an inhibitor of phosphodiesterase. Therefore, the cells of a person who has recently consumed coffee would have increased levels of (A) phosphorylated proteins. (B) GTP. (C) cAMP. (D) adenylyl cyclase.
- 18. Which of the following describes the events of apoptosis? (A) The cell dies, it is lysed, its organelles are phagocytized, and its contents are recycled. (B) Its DNA and organelles become fragmented, it dies, and it is phagocytized. (C) Its nucleus and organelles are lysed, then the cell enlarges and bursts. (D) Its DNA and organelles are fragmented, the cell shrinks and forms blebs, and the cell self-digests.
- 19. An example of a connective tissue is the (A) skin. (B) nerves. (C) blood. (D) smooth muscles.
- 20. Positive feedback has occurred when (A) an increase in blood sugar increases the secretion of a hormone that stimulates the movement of sugar out of the blood. (B) a decrease in blood sugar increases the secretion of a hormone that increases the conversion of glycogen to glucose. (C) uterine contractions needed for the birthing process are expedited by the pressure of a moving baby in its mother's uterus. (D) an increase in calcium concentration increases the secretion of a hormone that promotes the storage of calcium in bone.

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考試日期:107年3月9日第 - 節

本試題共 5 頁 (本頁為第 4頁)

科目:普通生何争(一)

系所組: 生命科学李

- 21. The only vertebrates in which blood flows directly from respiratory organs to body tissues without first returning to the heart are the (A) amphibians. (B) birds. (C) fishes. (D) reptiles.
- 22. Engulfing-phagocytic cells of innate immunity include all of the following *except* (A) neutrophils. (B) macrophages. (C) dendritic cells. (D) natural killer cells.
- 23. This type of immunity is present only when a newborn infant is being fed by actively nursing on its mother and ends when nursing ends. (A) innate immunity. (B) active immunity. (C) passive immunity. (D) cell-mediated immunity
- 24. The nitrogenous waste that requires the most energy to produce is (A) ammonia. (B) ammonium. (C) urea. (D) uric acid.
- 25. Following which molecule mechanisms is involved in animal morphogenesis:
- (1) reorganized cytoskeleton; (2) induced apoptosis; (3) Cell movement; (4) DNA rearrangement.
- (A) 1, 2 (B) 2, 3 (C) 1, 2, 3 (D) 2, 3, 4
- 26. Increased activity in the sympathetic nervous system leads to (A) increased secretion by the pancreas.
- (B) increased secretion by the gallbladder. (C) increased contraction of the stomach. (D) relaxation of the airways in the lungs.
- 27. Short-term memory information processing usually causes changes in the (A) brainstem. (B) medulla. (C) hypothalamus. (D) hippocampus.
- 28. Following which hormone is a endogenouse neuropeptide that might function as a natural analgesic.
 (A) substance P (B) endorphine (C) dopamine (D) acetylcholine
- 29. Animals use pheromones to communicate (A) species recognition. (B) gender recognition. (C) danger. (D) All options are correct.
- 30. Which of the following occurs in meiosis but not in mitosis? (A) chromosome replication (B) homologous chromosome separation (C) alignment of chromosomes at the equator (D) condensation of chromatin.

考試日期:107年3月9日第3節

本試題共 ぐ 頁 (本頁為第 ぐ頁)

科目: 普通生物学() 系所組: 生命科學学

(二) 問答題 (40%)

- 1. 請解釋下面的名詞 (10%, 每題 5分):
 - (1-A) checkpoint in cell cycle
 - (1-B) stem cells
- 2. To detail describe the antibody function. (10 points)
- 3. When the animals loss a lot of water or suffer the severe bleeding, how animal body to response it and to regulate the fluid retention in the kidney? (10 points)
- 4. To detail describe the hormones control of the female reproductive system in female vertebrates. (10 points)

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考試日期:107年3月9日第≥節本試題共 5 頁 (本頁為第 / 頁)

科目:普通生物學 (二)

系所組:生命科學系碩士班

Multiple choice (4 point for each question)

- The meristematic tissue used for secondary growth that is found between the xylem and phloem of each
 vascular bundle in eudicot stems is termed the
- A. apical meristem.
- B. root meristem.
- C. cork cambium.
- D. vascular cambium.
- E. pericycle.
- 2. For water transport to occur there must be
- A. palisade and spongy mesophyll.
- B. sugar in the phloem.
- atmospheric pressure available to do the work.
- D. low pressure in the roots and high pressure in the leaves.
- E. a continuous column of water in xylem and transpiration of water at the leaves.
- 3. Which two structures are associated with the terminal bud?
- A. apical meristem and leaf primordia
- B. shoot tip and zone of maturation
- C. apical meristem and zone of cell division
- D. zone of cell division and leaf primordia
- E. None of the answer choices is associated with the terminal bud.
- 4. Which events and features are correctly associated with the roots during the pressure-flow model of phloem transport?
- A. Sugar is stored in the sink. Cells use the sugar for cellular respiration. Water exits by osmosis and returns to the xylem.
- B. Sugars are stored in the source. Cells use the sugar for cellular respiration. Water exits by osmosis and returns to the xylem.
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- C. Sugar is stored in the sink. Cells use the sugar for photosynthesis. Water exits by osmosis and returns to the xylem.
- D. Sugar is stored in the sink. Cells use the sugar for cellular respiration. Water exits by diffusion and returns to the phloem.
- E. Sugar is stored in the source. Cells use the sugar for photosynthesis. Water exits by osmosis and returns to the xylem.
- 5. Double fertilization in an angiosperm produces
- A. a diploid zygote and a haploid polar nucleus.
- B. a diploid zygote and a diploid endosperm.
- C. a diploid embryo and a triploid zygote.
- D. a triploid embryo and a diploid endosperm.
- E. a diploid zygote and a triploid endosperm.
- 6. Which of the following statements is NOT correct about flowering plants?
- A. A sperm nucleus combines with one polar nucleus to form the endosperm.
- B. A sperm nucleus combines with the egg nucleus to eventually form the embryo.
- C. A pollen grain may be carried to the stigma of the ovary by the wind.
- D. A pollen tube grows down the style.
- E. They exhibit double fertilization.
- 7. Which of the following is arranged in proper order?
- A. fertilization pollination seed formation germination
- B. seed formation fertilization germination pollination
- C. pollination fertilization seed formation germination
- D. germination seed formation fertilization pollination
- E. pollination fertilization germination seed formation
- 8. Which part of photosynthesis does not occur inside the thylakoid membrane?
- A. noncyclic electron pathway
- B. cyclic electron pathway
- C. electron transport chain

- D. light reactions
- E. Calvin cycle reactions
- 9. Plants need other molecules besides glucose. Where do these molecules, such as cellulose and fructose, come from?
- A. Glucose must always be produced first: glucose can then be used as the monomer to form everything else.
- B. G3P is directly converted to many other organic molecules besides glucose.
- C. Plants absorb those molecules from the environment through their roots.
- D. Any molecule beyond glucose must be converted from plant tissues already present.
- E. Alternative forms of photosynthesis beyond those described must be producing those molecules.
- 10. Over time, what would we expect in the evolution of C3, C4, and CAM strategies?
- A. As the most complicated plants, CAM plants are most likely to go extinct.
- B. As the probable ancestral form of photosynthesis, C3 plants are primitive and most likely to go extinct.
- C. Because CAM plants make better usage of metabolism during the night, they are superior and will eventually become the dominant plants.
- D. Because CO2 is delivered by the bundle sheath cells in C4 plants, they are superior and will eventually dominate.
- E. Each form of photosynthesis has advantages in a heterogeneous world and, as long as environmental conditions vary, all forms will have an adaptive advantage in their unique niche.
- 11. In order to infect a cell, a virus must
- A. inject its protein into the cell while the nucleic acid remains attached to the host cell surface.
- B. have a special protein spike on its surface capsid that can interact with a receptor protein on the surface of the host cell.
- C. actively burrow through the cell wall or cell membrane of the host cell to reach the cell's nucleus.
- D. produce a special extension of its cytoplasm when it comes into contact with the appropriate host cell.
- E. have enzymes to break down the cell wall or cell membrane of the host cell.
- 12. Some human diseases appear to be due to protein agents that may convert other normal proteins in the cell to also become these agents. This new disease protein agent is called a(n)
- A. archeon.
- B. prion.

1	C. cyanobacterium.	
-	D. phage.	
	E. retrovirus.	
	13. Which statement is NOT true about the RNA-first hypothesis?	
	A. It is supported by the discovery that RNA can act as a catalyst.	
	B. It is supported by the fact that RNA can act as a substrate and as an enzyme.	
-	C. It suggests that there was an "RNA world" about 4 billion years ago.	
-	D. It says that first RNA, then DNA, then proteins would have been necessary to interact in the chemical	
	evolution that would have led to the development of the first cells.	
	E. It suggests that only RNA was needed to progress to the formation of the first cells.	
		- 1
	14. Which feature is lacking in the cell wall of archaea that will distinguish them from the bacteria?	
	Which feature is lacking in the cell wall of archaea that will distinguish them from the bacteria?A. peptidoglycan	
	A. peptidoglycan	
	A. peptidoglycan B. phospholipids	
	A. peptidoglycan B. phospholipids C. proteins	
	A. peptidoglycanB. phospholipidsC. proteinsD. polysaccharides	
	A. peptidoglycanB. phospholipidsC. proteinsD. polysaccharides	
	 A. peptidoglycan B. phospholipids C. proteins D. polysaccharides E. None of the answer choices are lacking in the cell walls of the archaea. 	
	 A. peptidoglycan B. phospholipids C. proteins D. polysaccharides E. None of the answer choices are lacking in the cell walls of the archaea. 15. Which description best fits a chemoautotroph bacteria? 	

They run photosynthesis that uses solar energy to produce their own food.

All of the answer choices are descriptions of a chemoautotroph bacteria.

They transfer electrons to sulfate, producing hydrogen sulfate.

Spirogyra practice a type of sexual exchange called

D.

16.

D.

budding.

aggregation.

fruiting body.

conjugation.

Ŀ.	gametogenesis.			
luc				
17.	Which includes the parasites that cause African sleeping sickness?			
A.	sporozoa			
B.	flagellates			
C.	slime molds			
D.	diatoms			
E.	ciliates			
18.	The kingdom Protista includes all of the following kinds of organisms EXCEPT			
A.	protozoa.			
В.	algae.			
C.	water molds.			
D.	yeasts.			
E.	slime molds.			
Sho	ort description question			
	9			
А Т	7. 1. d. 1.00			
A. I	Explain the difference between stolons and rhizomes. (8 point)			
B. Explain the structural differences that help a botanist differentiate between a monocot and a eudico				
(8 point)			
C.	C. Explain the difference between viruses, viroids and prions. (12 point)			
	Signature of the second			

考試日期:107年3月9日第 _ 節

本試題共 ど 頁 (本頁為第 / 頁)

科目: 生物化學

系所組:

生命科學系碩士班

有關測驗之計分規定:

1. 未按作答格式 (範例) 作答者,扣該科總分 10 分。

2. 未在彌封答案卷內作答者,不予計分。

(範例)選擇題作答格式:由左至右,每行填寫五題答案。

1. A	2.A	3.B	4.B	5.C
6. A	7.A	8.B	9.B	10.C
11. A	12.A	13.B	1 4.B	15.C
16. A	17.A	18.B	1 9.B	20.C
21. A	22.A	23.B	24.B	25.C
26. A	27.A	28.B	29.B	30.C

請依照上述範例之格式,以橫式書寫方式將全部答案寫在<u>彌封答案卷第一頁</u>,答案字母請用<u>正楷大寫 (A,B,C,D)。</u>

(範例) 問答題作答格式

1. Protein	
2. DNA	
3. RNA	

請依照上述範例之格式,以橫式書寫方式將全部答案寫在彌封答案卷第二頁。

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考試日期:107年3月9日第 ~ 節

本試題共 5 頁 (本頁為第 ン 頁)

科目: 生物化學

系所組: 生命科學系碩士班

- 、J	單選題 (每題2分,共70分)(請按作答方式,由左至右,每行填寫五題答案)
1. () Amino acids are named that because each one A) is a unique carboxylic acid; B) has a standard configuration; C) is an amino derivative of a carboxylic acid; D) is a carboxyl derivative of an amide acid.
2. () At neutral pH, the net charge of serine is A) positive; B) negative; C) zero; D) None of the above.
3. () Ultraviolet (UV) light can be used to estimate protein solution concentrations because A) phenylalanine absorbs at 260 nm; B) all the amino acids absorb UV light; C) aromatic amino acids absorb at 280 nm; D) tryptophan and tyrosine absorb at 280 nm; E) All of the above.
4. () Basic amino acids are (positive, negative) at pH 7 and acidic R group amino acids are (positive, negative) at pH 7. A) negative; positive; B) negative; negative; C) positive; negative; D) positive; positive
5. () Which technique is commonly used to determine the three-dimensional conformation of a protein? A) Isoelectric focusing; B) The Edman degradation; C) SDS-PAGE; D) X-ray crystallography.
6. () Which statement is NOT true about an α-helix? A) It is usually right-handed; B) It is a type of secondary structure; C) It frequently contains proline residues; D) It is stabilized by hydrogen bonding.
7. () The principle forces holding subunits of an oligomeric protein to each other are A) peptide bonds; B) disulfide bonds; C) covalent bonds; D) hydrophobic interactions
8. (is used to estimate the molecular weight of oligomeric proteins, while is used to determine molecular weight of each protein. A) Melting point; SDS-gel electrophoresis B) SDS-gel electrophoresis; gel-filtration chromatography C) Acrylamide gel electrophoresis; isoelectric focusing D) Gel-filtration chromatography; SDS-gel electrophoresis E) SDS-gel electrophoresis; NMR
9. () Which of the following compound does not donate any structure moiety to the heterocyclic ring of pyrimidine? (A) glutamine (B) glutamate (C) aspartate (D) bicarbonate
10.() The final catabolic product of hypoxanthine in human is (A) Urea (B) Uric acid (C) acetyl-CoA (D) NH ₄ .
11.() Which is the precursor of all pyrimidine ribo- and deoxyribonucleotides? A) dTMP; B) CTP; C) IMP; D) UMP.
12.() In the signal transduction adenylyl cyclase signaling pathway, what could be the major second messenger? (A) AMP (B) cAMP (C) ADP (D) ATP.
13.() (A) Pyruvate (B) Acetyl-coA (C) Oxaloacetate (D) Phosphoenolpyruvate is the

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考試日期:107年3月9日第2節

本試題共 5 頁 (本頁為第 3 頁)

件目:	生物化學	系所組:	生命科學系碩士班
		mediate for amino acid, gluc	ose and fatty acid
14.(about 92°C, what will p	ence GGCGATATGTACCC possible be the melting tempe AAAT? (A) 30°C; (B) 78°C	rature for sequence
15.() The conversion of acety Acetyl-CoA:ACP trans	vl-CoA to malonyl-CoA is car acylase; (B) Acetyl-CoA carb yl-CoA:ACP transacylase.	talyzed by (A)
16.(3-Hydroxy-3-methylglu HMG-CoA reductase; (of above.		mevalonate by (A) MG-CoA synthase; (D) None
17.(molecules presented the	at converted to acetone from l	nce, acetyl-CoA might not go HMG-CoA. Which of the
	HMG-CoA reductase; of above.	lyzes the conversion of aceto (B) HMG-CoA lyase; (C) HM	MG-CoA synthase; (D) none
18.(as a(n) A) transition	on state; B) neutrophile; C) nu	nshared electron pair may act acleophile; D) electrophile.
19.(transition state; C) may and C; E) B and C.	ive site which A) fits the sy contain hydrogen bonds wh	ich are covalent-like; D) A
20.(subunits of the enzyme structure which act to residues close enough	hymotrypsin and other serine e; B) three amino acid resid make serine a strong nucleop in space to make serine a stro nilar structural features; E)	hile; C) three amino acid ong nucleophile; D) three
21.() The mechanism of acti	on of lysozyme includes	A) distortion of the substrate; n of a half-chair sugar form; E)
22.() Unlike coenzymes that an enzyme reaction an metalloenzymes; C) co	d dissociate from the active sosubstrates; D) holoenzymes	
23.() The degradation of asp with as its p D) pyridoxal phosphat	partic acid to oxaloacetic acid prosthetic group. A) thiam	is catalyzed by an enzyme ine; B) biotin; C) vitamin B ₁₂ ;
24.() Vitamin C is not a coe	nzyme but acts in cell metabo	

^{2.}本試題紙空白部份可當稿紙使用。

考試日期:107年3月9日第 _ 節

本試題共 5 頁 (本頁為第 4 頁)

科目:	生物化學	系所組:	生命科學系碩士班	(<u>*</u>)
25.(limit dextrin are and B; E) A, B, an	man intestine which are needed to A) α-Amylase; B) β-Amylase; od C.	C) debranching enzymes; D) A	
26.(D5,8,11 isunsaturated; D) un	saturated; saturated; E) monouns	omplex; simple; C) saturated; saturated; polyunsaturated	
27.(a double bond thre carbons from the a		ain; D) has a double bond three	
28.(amphipathic; B) no biological pH.	re not found in cell membranes b ot amphipathic; C) not abundant	in cells; D) charged at	
29.(where drugs can b present. A) ch glycolipids	bilayers that enclose contained for delivery to specifically be contained for the containe	fic tissues if target proteins are C) phospholipids; D)	
30.(odd-chain fatty ac decarboxylase; (C	(l) methylmalonyl-CoA mutase;	racemase; (B) propionyl-CoAD) propionyl-CoA carboxylase.	
31.() Which shows the p gluconeogenesis?A) Pyruvate → pho		ite to phosphoenolpyruvate in	
* 180	 C) Pyruvate → oxa D) Pyruvate → oxa E) Pyruvate → lact 	PCK→ phosphoenolpyruvate loacetate → 2-phosphoglycerate loacetate → phosphoenolpyruvatate → oxaloacetate → phosphoe	te nolpyruvate	•
32.(the synthesis of _		s an intermediate that is used in	
	B) GlyceraldehydeC) Ribose 5-phosplD) NADHE) CO₂	phateglycogen 3-phosphateproteins hateDNA and l ATP amino acid	ds	
33.() Which is not a res A) 2 molecules of 0 B) 3 molecules of 1 C) 1 substrate-leve D) 2 QH₂ are produce E) The oxidation of 	sult of one pass through the citric CO ₂ are produced. NADH are produced from NAD ⁺ I phosphorylation occurs to produced by the succinate dehydrogen of L-malate regenerates oxaloacet	acid cycle? . uce GTP or ATP. nase complex. tate.	
34. () Which shows the chain component	e proper order of electron transfe ts (not all electron carriers are sho	r for the listed electron transport own)?	M - 12

[※] 注意:1.考生須在「彌封答案卷」上作答。

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考試日期:107年3月9日第二節

本試題共 (頁 (本頁為第 ≤ 頁)

科目: ,

生物化學

系所組:

生命科學系碩士班

- A) NADH $\rightarrow \rightarrow Q \rightarrow \rightarrow$ cytochrome $c \rightarrow \rightarrow O_2$
- B) $O_2 \rightarrow \rightarrow$ cytochrome $c \rightarrow \rightarrow$ $Q \rightarrow \rightarrow$ NADH
- C) NADH $\rightarrow \rightarrow$ cytochrome $c \rightarrow \rightarrow Q \rightarrow \rightarrow$ O_2
- D) $Q \rightarrow \rightarrow NADH \rightarrow \rightarrow cytochrome c \rightarrow \rightarrow O_2$
- E) NADH \rightarrow \rightarrow O₂ \rightarrow \rightarrow cytochrome $c \rightarrow$ \rightarrow Q
- 35.() What type of reactions form the basis of the electron transport chain and what is the final electron acceptor? A) Acid-base reactions; O₂ B) Acid-base reactions; water C) Oxidation-reduction reactions; water D) Oxidation-reduction reactions; NADH E) Oxidation-reduction reactions; O₂

二、問答題 (共 30 分)

- 1. Please state five metabolic pathways that required the molecule PRPP (5%)
- 2. Describe the complete procedure of making 0.2 L of 20 mM Tris (pH 8.4) solution starting from the Tris powder (MW 121.1) and distilled water. (4%)
- 3. Describe three ways that enzyme activity is regulated. (3%)
- 4. Glutathione, a tripeptide (γ-Glu-Cys-Gly), is an important antioxidant in plants, animals, fungi, and some bacteria. Please draw the structure. (5%)
- 5. What is the net outcome per molecule of glucose during glycolysis? _____NADH produced; _____ ATP produced; ____ pyruvate produced. (3%)
- 6. Please draw the urea cycle. (5%)
- 7. How can we detect DNA replication in asynchronized cells? (3%)
- 8. Please put the following steps in order for His-tag protein purification. (2%)
 - (a) check by SDS-PAGE (b) IPTG induction (c) wash with 20 mM imidazole (d) apply to a Ni²⁺-NTA column (e) elute with 250 mM imidazole (f) harvest E. coli

^{2.}本試題紙空白部份可當稿紙使用。

^{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。