國立中山大學111學年度
學士後醫學系招生考試試題

科目名稱：普通生物及生化概論

—作答注意事項—

考試時間：100分鐘

- **考試開始鈴響前不得翻閱試題，並不得書寫、劃記、作答。**請先檢查答案卡之應考證號碼、桌角號碼、應試科目是否正確，如有不同立即請監試人員處理。
- 答案卡請以2B鉛筆劃記，不可使用修正液（帶）塗改，未使用2B鉛筆、劃記太輕或污損致光學閱讀機無法辨識答案者，後果由考生自負。
- 答案卡應保持清潔完整，不得折疊、破壞或塗改應考證號碼及條碼，亦不得書寫考生姓名、應考證號碼或與答案無關之任何文字或符號。
- **不可使用計算機**，並不得攜帶具有通訊、記憶或收發等功能或其他有礙試場安寧、考試公平之各類器材、物品（如鬧鈴、行動電話、電子字典等）入場。
- **試題及答案卡請務必繳回，未繳回者該科成績以零分計算。**
- **試題採雙面列印，考生應注意試題頁數確實作答。**
- **違規者依本校招生考試試場規則及違規處理辦法處理。**

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※本科目依簡章規定「不可以」使用計算機(選擇題)

※選擇題(單一選擇題，共90題，總分150分)

壹、第1~30題每題1分，共30分，每題答錯倒扣四分之一。

1. Where does the Krebs cycle take place?
   A. Mitochondrial matrix
   B. Inner membrane of the mitochondrion
   C. Outer membrane of the mitochondrion
   D. Intermembrane space of the mitochondrion
   E. Cytoplasm (outside the mitochondria)

2. Nitrogen fixation can occur in which of the following organisms?
   A. prokaryotes
   B. plants
   C. animals
   D. prokaryotes and plants
   E. prokaryotes, plants and animals

3. The use of mRNA and reverse transcriptase is part of a strategy to solve the problem of
   A. epigenetic regulation.
   B. post-translational processing.
   C. nucleic acid hybridization.
   D. restriction fragment ligation.
   E. post-transcriptional processing.

4. What is the most common transported sugar in the plant?
   A. Glyceraldehyde 3-phosphate
   B. Fructose
   C. Mannose
   D. Starch
   E. Sucrose

5. The best time to measure an animal's basal metabolic rate is when the animal
   A. is resting and has not eaten its first meal of the day.
   B. is resting and has just completed its first meal of the day.
   C. has recently eaten a sugar-free meal.
   D. has not consumed any water for at least 48 hours.
   E. has just completed 30 minutes of vigorous exercise.

6. When human beings choose a mate, they usually prefer people with the same skin color, same culture, same language, and similar living habits. Which of the following is related to this phenomenon?
   A. panmixia
   B. heterosis
   C. outcrossing
   D. backcrossing
   E. assortative mating

7. Cytoskeleton of a eukaryotic cell is made up of (a)microtubule, (b)microfilament and (c)intermediated filaments. Which of them exhibits polarity?
   A. a
   B. b

C. c
D. a and b
E. b and c

8. Mitochondria are thought to be the descendants of certain alpha proteobacteria. They are, however, no longer able to lead independent lives because most genes originally present on their chromosomes have moved to the nuclear genome. Which phenomenon accounts for the movement of these genes?
A. homologous recombination
B. plasmolysis
C. horizontal gene transfer
D. conjugation
E. translation

9. What controls sex determination in American alligator?
A. Temperature
B. Behavioral interactions
C. Y Chromosome
D. Ratio of X chromosomes to autosomes
E. SRY gene

10. Why are action potentials usually conducted in only one direction along an axon?
A. The nodes of Ranvier can conduct potentials in only one direction.
B. The brief refractory period prevents reopening of voltage-gated Na^+ channels.
C. The axon hillock has a higher membrane potential than the terminals of the axon.
D. Ions can flow along the axon in only one direction.
E. Voltage-gated channels for both Na^+ and K^+ open in only one direction.

11. Which statement about biological homology is correct?
A. Paralogs: Insect wings and bat wings are both used for flight.
B. Orthologs: Humans use different MHC gene copies to identify different pathogens.
C. Analogs: The human eye is structurally similar to the octopus's eye.
D. Homologs: The needles of cacti (仙人掌) and hedgehogs (刺蝟) are used for physical defense.
E. Paralogs: Differentiation of the functions of the forelimb and hindlimb in humans.

12. Which of the following statements regarding photoperiodism is **false**?
A. Photoperiodism is the physiological reaction of organisms to the length of a dark period. It occurs in both plants and animals.
B. Many flowering plants (angiosperms) use photoreceptors such as phytochrome and cryptochrome to sense photoperiod.
C. Long-day plants flower when the night length falls below their critical photoperiod.
D. The shoot apical meristem that senses the photoperiod leading to its transition from a vegetative (leaf) bud to a reproductive (flower) bud.
E. Day-neutral plants such as maize do not initiate flowering based on photoperiodism.

13. All female mammals have one active X chromosome per cell instead of two. What causes this to happen?
A. attachment of methyl (-CH3) groups to the X chromosome that will remain active
B. only the X chromosome from mother will remain active
C. inactivation of the *XIST* gene on the X chromosome derived from the male parent

D. activation of the *BARR* gene on one X chromosome, which then becomes inactive
E. activation of the *XIST* gene on the X chromosome that will become the Barr body

14. A genetic map shows the map distance. The units of genetic distance are called **map units** (mu) or **centiMorgans** (cM). Which of the following indicates the map distance of 23.6 mu between two genes?
A. The distance between two genes is 23.6 millimeters.
B. There are 23.6 other genes between the two genes of interest.
C. The co-mutation rate of two genes is 23.6%.
D. The survival rate of the offspring is 23.6%.
E. 23.6% of the offspring exhibit recombination between the two genes.

15. A researcher is analyzing the immune response of a patient following the patient's exposure to an unknown agent while out of the country. The patient's blood is found to have a high proportion of lymphocytes with CD8 surface proteins. What is the likely cause?
A. The patient encountered a bacterial infection which elicited CD8 marked T cells.
B. The disease must have been caused by a multicellular parasite, such as can be encountered in polluted water sources.
C. The CD8 proteins would be discharged from these lymphocytes to lyse the infected cells.
D. The CD8 proteins marked the surfaces of cytotoxic T cells to attack virus-infected host cells.
E. CD8 marks the surface of cells that accumulate after the infection is over and signal patient recovery.

16. What is the name of the protein that is used to form the initial glycogen primer?
A. phosphoporin
B. glucokinase
C. glycoporin
D. glycogenin
E. pyrophorin

17. Which of the following pairs of amino acids could form electrostatic interactions by their side chains?
A. Serine and phenylalanine
B. Glutamic acid and arginine
C. Alanine and glutamine
D. Leucine and cysteine
E. Histidine and Isoleucine

18. In humans, gluconeogenesis:
A. can result in the conversion of protein into blood glucose.
B. helps to reduce blood glucose after a carbohydrate-rich meal.
C. is activated by the hormone insulin.
D. is essential in the conversion of fatty acids to glucose.
E. requires the enzyme hexokinase.

19. Which of the following is (are) NOT found as covalently attached anchors in lipid-linked proteins?
A. isoprenoid groups
B. fatty acids
C. cholesterol and other sterols
D. glycosylphosphatidyl inositol groups

E. All of the above are found as covalently attached anchors in lipid-linked proteins.

20. Aspirin inhibits the synthesis of which of the following sets of eicosanoids?
A. Prostaglandin E2 and leukotriene A4
B. Thromboxane A2 and leukotriene C4
C. Prostaglandin F2 and thromboxane A2
D. Prostaglandin A2 and 5-hydroperoxyeicosatetraenoic acid
E. Thromboxane A2 and 5-hydroperoxyeicosatetraenoic acid

21. In which metabolic pathway does glucose-6-phosphate dehydrogenase play a key role?
A. glycogenesis
B. glycolysis
C. gluconeogenesis
D. glycogenolysis
E. pentose phosphate pathway

22. Which of the following explains are the enzyme effects?
A. Enzymes release products very rapidly
B. Enzymes can lower product energy
C. An enzyme stabilizes the transition state of the reaction
D. An enzyme can convert a normally endergonic reaction into an exergonic reaction
E. An enzyme lowers the energy of activation only for the forward reaction

23. Enzymes are biological catalysts that enhance the rate of a reaction by:
A. decreasing the activation energy.
B. decreasing the amount of free energy released.
C. increasing the activation energy.
D. increasing the amount of free energy released.
E. increasing the energy of the transition state.

24. To determine the isoelectric point of a protein, first establish that a gel:
A. contains a denaturing detergent that can distribute uniform negative charges over the protein's surface.
B. exhibits a stable pH gradient when ampholytes become distributed in an electric field.
C. is washed with an antibody specific to the protein of interest.
D. neutralizes all ionic groups on a protein by titrating them with strong bases.
E. relates the unknown protein to a series of protein markers with known molecular weights, M*r*.

25. Which of the following lipids can be formed by the methylation of phosphatidylethanolamine?
A. Phosphatidylinositol
B. Phosphatidylcholine
C. Phosphatidylserine
D. Sphingomyelin
E. Lysophosphatidylcholine

26. Which volatile short-chain fatty acid is believed to lower serum cholesterol by acting as an inhibitor of cholesterol biosynthesis?
A. acetic
B. butyric

C. propionic
D. palmitic
E. lauric

27. Which of the following techniques was NOT used to determine the three-dimensional structure of protein?
A. NMR spectroscopy
B. X-ray diffraction
C. Cryogenic electron microscopy
D. UV/Vis spectroscopy
E. All of the above

28. Which of these statements is generally true of integral membrane proteins?
A. A hydropathy plot reveals one or more regions with a high hydropathy index.
B. The domains that protrude on the cytoplasmic face of the plasma membrane nearly always have covalently attached oligosaccharides.
C. They are unusually susceptible to degradation by trypsin.
D. They can be removed from the membrane with high salt or mild denaturing agents.
E. They undergo constant rotational motion that moves a given domain from the outer face of a membrane to the inner face and then back to the outer.

29. In a newly discovered electron transport complex a researcher has identified the redox center Fe-S, cytochrome c, and coenzyme Q. The researcher also knows that this complex ultimately passes its electrons to oxygen. What is most likely the redox center which completes this task?
A. Fe-S
B. 2Fe-2S
C. coenzyme Q
D. cytochrome c
E. None of the above

30. Which of the following pairs of sugars are epimers of each other?
A. D-sorbose and D-fructose
B. D-sorbose and D-xylulose
C. D-arabinose and D-ribose
D. D-fructose and L-fructose
E. D-ribose and D-ribulose

貳、第31~90題每題2分，共120分，每題答錯倒扣四分之一。

31. Which description of fungi is correct?
A. Ascomycota: Multinucleate hyphae lack septa
B. Glomeromycota: Form arbuscular mycorrhizae
C. Ascomycota: In sexual reproduction, four ascospores are formed inside a sac called an ascus
D. Basidiomycota: In sexual reproduction, eight basidiospores are borne on a club-shaped basidia
E. Zygomycota: the heterokaryotic (dikaryotic) stage can be found in the life cycle

32. Developmentally, which type of human tooth is most similar to ivory (象牙)?
A. incisor
B. canine
C. premolar

D. molar
E. third molar (wisdom tooth)

33. How many photons are required to generate one O_2 molecule during photosynthesis light reaction?
A. 2
B. 4
C. 8
D. 12
E. 16

34. What is the effect of a nonsense mutation in a gene?
A. It introduces a premature stop codon into the mRNA.
B. It changes an amino acid in the encoded protein.
C. It has no effect on the amino acid sequence of the encoded protein.
D. It alters the reading frame of the mRNA.
E. It prevents introns from being excised.

35. Within a cell, the amount of protein made using a given mRNA molecule depends partly on
A. the rate at which the mRNA is degraded.
B. the number of introns present in the mRNA.
C. the types of ribosomes present in the cytoplasm.
D. the degree of histone acetylation
E. the degree of DNA methylation.

36. Phylogenetic trees constructed from evidence from molecular systematics are based on similarities in _____.
A. phenotypes
B. morphology
C. mutations to homologous genes
D. the pattern of embryological development
E. biochemical pathways

37. Imprinting has a great impact on normal mammalian development, fetal growth, metabolism and adult behavior. The current molecular explanation for imprinting in mammals involves differential _____ of various DNA regions.
A. Mutations
B. Phosphorylation
C. Dephosphorylation
D. Methylation
E. Transcription

38. CRISPR-Cas9 is adapted from a naturally occurring genome editing system that bacteria use as an immune defense. Which of the following characteristics makes the CRISPR-Cas9 system an efficient way to generate knockout cell lines?
A. It precisely cuts DNA.
B. It removes random DNA bases.
C. It forms a complex with proteins.
D. It applies to both in prokaryotes and eukaryotes.
E. Its function is regulated by complementary guide RNAs.

39. Which of the following would you expect to be a problem for someone with nonfunctional chloride channeling?
A. inadequate secretion of mucus
B. buildup of excessive secretions in organs such as lungs
C. buildup of excessive secretions in glands such as the pancreas
D. sweat that includes no NaCl
E. mental retardation due to low salt levels in brain tissue

40. Plants often use changes in day length (photoperiod) to trigger events such as dormancy and flowering. It is logical that plants have evolved this mechanism because photoperiod changes
A. are more predictable than air temperature changes.
B. alter the amount of energy available to the plant.
C. are modified by soil temperature changes.
D. can reset the biological clock.
E. are correlated with moisture availability.

41. Which description of the lateral line system is **false**?
A. The lateral line system is found in amphibian larvae and fishes.
B. The lateral line system in fish can reflect pressure waves and low-frequency vibrations.
C. The lateral line system consists of hair cells within a longitudinal canal in the fish's skin.
D. The hair cells in the lateral line system are innervated by motor neurons that transmit impulses to the brain.
E. The hair cells' surface processes project into a gelatinous membrane called a cupula.

42. Which of the following statement about the structure of sarcomeres in relaxed and contracted muscles is **false**?
A. The I bands form the borders of each sarcomere.
B. The A bands represent thick filaments.
C. The thin filaments are within the I bands and extend into the A bands.
D. In the contracted muscle, the I bands and H bands become shorter.
E. In the contracted muscle, the Z lines have moved closer together.

43. Plant cells and animal cells both evolve specialized conduits that directly connect the cytoplasm of two cells. What are they?
A. plasmodesmata in plant cells, desmotubules in animal cells
B. desmotubules in plant cells, plasmodesmata in animal cells
C. gap junctions in plants cells, plasmodesmata in animal cells
D. plasmodesmata in plant cells, gap junctions in animal cells
E. gap junctions in plant cells, desmotubule in animal cells

44. In plants, the climacteric is a stage of fruit ripening associated with increased production of which plant hormone?
A. auxin
B. abscisic acid
C. cytokinin
D. ethylene
E. Gibberellin

45. In humans, ABO blood types refer to glycoproteins in the membranes of red blood cells. There are three alleles for this autosomal gene: *IA*, *IB*, and *i*. The *IA* allele codes for the A glycoprotein, The *IB* allele codes for the B glycoprotein, and the *i* allele doesn't code for any membrane glycoprotein. *IA* and *IB* are codominant, and *i* is recessive to both *IA* and *IB*. People with type A blood have the genotypes *IAIA* or *IAi*, people with type B blood are *IBIB* or *IBi*, people with type AB blood are *IAIB*, and people with type O blood are *ii*. If a woman with type B blood marries a man with type A blood, which of the following blood types could their children possibly have?
    A. A and B
    B. AB and O
    C. A, B, and AB
    D. A, B, and O
    E. A, B, AB, and O

46. How does the enzyme telomerase meet the challenge of replicating the ends of linear chromosomes?
    A. It adds numerous GC pairs, which resist hydrolysis and maintain chromosome integrity.
    B. It catalyzes the shortening of telomeres, compensating for the elongation that could occur during replication without telomerase activity.
    C. It adds a single 5' cap structure that resists degradation by nucleases.
    D. It is a reverse transcriptase that carries its own RNA molecule that works as a template to lengthen telomeres.
    E. It causes specific double-strand DNA breaks that result in blunt ends on both strands.

47. Which of the following enzymes is the most abundant protein in the chloroplast and incorporates CO_2 molecules to ribulose diphosphate?
    A. Aldolase
    B. Rubisco
    C. Phosphoglycerate kinase
    D. Triose phosphate isomerase
    E. Glyceraldehyde 3-phosphate dehydrogenase

48. Several adaptations that facilitate survival and reproduction on dry land emerged after plants diverged from algal. Which of the following traits is found in plants but not in charophyte algae?
    A. Alternation of generations.
    B. Chloroplasts with chlorophylls *a* and *b*.
    C. Circular rings of cellulose-synthesizing proteins.
    D. Flagellated sperm.
    E. Sporopollenin in zygotes.

49. When DNA is compacted by histones into 10 nm and 30 nm fibers, the DNA is unable to interact with proteins required for gene expression. Therefore, to allow for these proteins to act, the chromatin must constantly alter its structure. Which processes contribute to this dynamic activity?
    A. DNA supercoiling at or around H1
    B. methylation and phosphorylation of histone tails
    C. hydrolysis of DNA molecules where they are wrapped around the nucleosome core
    D. accessibility of heterochromatin to phosphorylating enzymes
    E. nucleotide excision and reconstruction

50. Some viruses can undergo latency, the ability to remain inactive for some period of time. Which of the following is an example?
    A. influenza, a particular strain of which returns every 10-20 years

B. herpes simplex viruses (oral or genital) whose reproduction is triggered by physiological or emotional stress in the host
C. Kaposi's sarcoma, which causes a skin cancer in people with AIDS, but rarely in those not infected by HIV
D. the virus that causes a form of the common cold, which recurs in patients many times in their lives
E. myasthenia gravis, an autoimmune disease that blocks muscle contraction from time to time

51. Which of the following regarding the human viral disease is **false**?

	Disease	Pathogen	Genome	Epidemiology
A.	Hepatitis B (viral)	Hepadnavirus	Double-stranded DNA	Infected via body fluids; Vaccine available; No cure; Can be fatal.
B.	Herpes	HSV	Double-stranded DNA	Blisters; Skin-to-Skin Contact; No cure; Exhibits latency for several years
C.	AIDS	HIV	Single-stranded DNA	Acute viral infection of the CNS that can lead to paralysis; Vaccine available; Can be fatal.
D.	Influenza	Influenza viruses	(–) Single-stranded RNA	Extremely contagious; Vaccine available; Usually contracted in childhood; More dangerous to adults
E.	SARS	Coronavirus	(–) Single-stranded RNA	Acute respiratory infection; Can be fatal; Domestic animals can be infected.

52. What period of the malaria parasite (*Plasmodium malariae*) is not inside the human body?
A. schizont
B. trophozoite
C. oocyst
D. merozoite
E. sporozoite

53. Which of the following statements regarding abscisic acid (ABA) is **false**?
A. ABA is a plant-specific hormone and does not found in human body.
B. It is a 15-carbon weak acid terpenoid hormone.
C. It is found in high concentrations in newly abscissed leaves.
D. ABA accumulates within seeds during fruit maturation thus preventing premature seed germination.
E. It is synthesized from carotenoids in a series of reactions in plastids and cytoplasm.

54. A pilus (plural: pili) is a hair like structure found on the surface of many bacteria. Which of the following statements regarding pilus is **false**?
A. It is made of pilin.
B. It participates in the process of bacterial conjugation.
C. Pili are responsible for virulence in many pathogenic strains of bacteria.
D. Pili can protect bacterial cells against bacteriophage.
E. Pili are antigenic.

55. The Dunkers are a religious group that moved from Germany to Pennsylvania in the mid-1700s. They do not marry with members outside their own immediate community. Today, the Dunkers are genetically unique and differ in gene frequencies, at many loci, from all other populations including those in their original homeland. Which of the following mechanisms likely explains the genetic uniqueness of this population?

A. mutation and natural selection
B. founder effect and genetic drift
C. disassortative mating and divergent selection
D. population bottleneck and Hardy-Weinberg equilibrium
E. heterozygote advantage and stabilizing selection

56. Transcriptome analysis is a tool used in genetic research to determine the mRNAs being produced in a particular tissue, and their relative level of expression. Known genes can therefore be assayed for their expression in different situations. One use of the technology is in cancer diagnosis and treatment. If a known gene functions as a tumor suppressor, predict which of the following pieces of evidence would be most useful in diagnosis of a cancer due to a mutation in this tumor-suppressor gene.
A. The tissue sample shows a high level of gene expression relative to a control (noncancerous) sample.
B. The tissue sample responds to treatment with a mitosis-promoting compound.
C. The tissue sample shows similar expression level of housekeeping genes with a control sample.
D. The mRNAs for cyclins and kinases show unusually high levels of expression.
E. The mRNAs for the targeted tumor suppressor sequence are not expressed.

57. An unusual example of natural variation in the ploidy occurs in some species. Which of the following statements describes the endopolyploidy most correct?
A. The endopolyploidy is due to a cell division defect, and it occurs only in lower animals.
B. Endopolyploidy is the occurrence in somatic tissues; the most common is in human nerve and epidermal cells.
C. An example of endopolyploidy is in the salivary gland cells of *Drosophila*, the pairs of chromosomes double approximately 9 times.
D. The chromosomes undergo repeated rounds of chromosome replication without cellular division, the backup copies of chromosomes kept in vacuoles that segregated away from the functional copies.
E. The entire organism has extra copies of certain chromosomes, for producing additional gene products.

58. *Drosophila* is a model animal that is often used in genetic research. Which of the following is the best method for distinguishing the sex of *Drosophila*?
A. The Y chromosome plays a pivotal role in determining the male sex. *Drosophila* with Y chromosome is male, the rest is female.
B. Sex combs are located only on the forelegs of male, but not female *Drosophila*.
C. Male *Drosophila* is brighter and larger than female.
D. Male *Drosophila* has red eyes, and female *Drosophila* has white eyes.
E. Male *Drosophila* has curled wings, and female *Drosophila* has flat wings.

59. How do ADH and RAAS work together in maintaining osmoregulatory homeostasis?
A. ADH monitors osmolarity of the blood and RAAS regulates blood volume.
B. ADH monitors appropriate osmolarity by reabsorption of water, and RAAS maintains osmolarity by stimulating Na^+ reabsorption.
C. ADH an RAAS work antagonistically; ADH stimulates water reabsorption during dehydration and RAAS removal of water when it is in excess in body fluids.
D. Both stimulate the adrenal gland to secrete aldosterone which increases both blood volume and pressure.
E. Only when they are together in the receptor sites of proximal tubule cells, will reabsorption of essential nutrients back into the blood take place.

60. Which of the following statements about the adrenal gland is correct?
A. During stress, TSH stimulates the adrenal cortex and medulla to secrete acetylcholine.
B. During stress, the alpha cells of islets secrete insulin and simultaneously the beta cells of the islets secrete glucagon.
C. At all times, the adrenal gland monitors calcium levels in the blood and regulates calcium by secreting the two antagonistic hormones, epinephrine and norepinephrine.
D. At all times, the anterior portion secretes ACTH, while the posterior portion secretes oxytocin.
E. During stress, ACTH stimulates the adrenal cortex, and neurons of the sympathetic nervous system stimulate the adrenal medulla.

61. The purpose of the hexose monophosphate shunt is to produce ____.
A. pentose phosphates and NADPH
B. DNA and RNA
C. fatty acids
D. reducing substrates
E. ATP

62. Which integral membrane protein is uniquely found in the mitochondria of brown fat?
A. fatty acid synthase
B. catalase
C. ATP Synthase
D. UCP1
E. FATP

63. What is the mode of action of Vancomycin?
A. Inhibition of cell wall biosynthesis
B. Inhibition of DNA biosynthesis
C. Inhibition of protein biosynthesis
D. Inhibition of folic acid biosynthesis
E. None of the above

64. Glycogen, amylose, and amylopectin are storage polysaccharides. Which one is linear form?
A. Glycogen
B. Amylose
C. Amylopectin
D. All of the above
E. None of the above

65. Which of the following statements about protein-ligand binding is correct?
A. The K*a* is equal to the concentration of ligand when all of the binding sites are occupied.
B. The K*a* is independent of such conditions as salt concentration and pH.
C. The larger the K*a* (association constant), the weaker the affinity.
D. The larger the K*a*, the faster is the binding.
E. The larger the K*a*, the smaller the K*d* (dissociation constant).

66. Which of the following is a heteropolysaccharide?
A. Cellulose
B. Chitin

C. Glycogen
D. Hyaluronate
E. Starch

67. The symptoms of severe combined immunodeficiency syndrome (SCID) are caused by a deficiency of which of the following enzymes?
A. adenine phosphoribosyltransferase
B. HGPRT (hypoxanthine–guanine phosphoribosyltransferase)
C. adenosine deaminase
D. dihydrofolate reductase
E. xanthine oxidase

68. Transport of fatty acids from the cytoplasm to the mitochondrial matrix requires:
A. ATP, carnitine, and coenzyme A.
B. ATP, carnitine, and pyruvate dehydrogenase.
C. ATP, coenzyme A, and hexokinase.
D. ATP, coenzyme A, and pyruvate dehydrogenase.
E. carnitine, coenzyme A, and hexokinase.

69. Which of the following enzymes is inhibited by malonyl-CoA?
A. Fatty acid synthase
B. Acetyl-CoA carboxylase
C. Hormone-sensitive lipase
D. Carnitine acyltransferase-1
E. Hydroxymethylglutaryl CoA reductase

70. What is the CORRECT sequence of events involving cyclic AMP as a second messenger of glucagon hormone?
I. the stimulation of the activity of adenylate cyclase.
II. the activation of G-proteins.
III. the conversion of ATP to cyclic AMP.
IV. the activation of protein kinase A.
V. the stimulation of lipid mobilization.
VI. an increase in the activity of hormone-sensitive lipase.
A. II, I, III, VI, IV, V
B. II, I, III, IV, V, VI
C. II, I, IV, III, V, VI
D. II, I, III, IV, VI, V
E. II, I, IV, III, VI, V

71. When the amino group has been removed from an amino acid, the carbon skeleton or α-keto acid may be used in many different ways. Which of the following is NOT a possible fate for the carbon skeleton?
A. conversion to glucose
B. oxidation for energy
C. synthesis of fat
D. synthesis of creatine
E. synthesis of ketones

72. Which process is NOT a source of ammonia in the body?

A. urea formation in the liver
B. deamination of amide groups from glutamine
C. degradation of pyrimidines
D. bacterial lysis of urea and amino acids in the GI tract
E. complete oxidation of amino acids

73. Reduction of the carbonyl group on a sugar rise to the class of polyhydroxy compounds called alditols. Important naturally occurring ones are erythritol, D-mannitol, and D-glucitol, often called sorbitol. When sorbitol accumulates in the lens of the eye of a person with diabetes, it can lead to the formation of _____.
A. Glaucoma
B. Amblyopia
C. Cataract
D. Strabismus
E. None of the above

74. Enzyme kinetics provide the values of the Michaelis constant K_M and the turnover number K_{cat}. Which of the following statements is true?
A. K_M indicates the substrate concentration at which the reaction rate is V_{max}
B. K_M measures the rate of the catalytic process
C. K_M indicates the substrate binding affinity; the smaller K_M indicates the higher substrate binding affinity
D. In enzyme inhibition study, a competitive inhibitor decreases the apparent K_M
E. All of the above

75. Which of the following is not correct concerning cooperative binding of a ligand to a protein?
A. It is usually a form of allosteric interaction.
B. It is usually associated with proteins with multiple subunits.
C. It rarely occurs in enzymes.
D. It results in a nonlinear Hill Plot.
E. It results in a sigmoidal binding curve.

76. Which of the following is not involved in the specificity of signal transduction?
A. Interactions between receptor and signal molecules
B. Location of receptor molecules
C. Structure of receptor molecules
D. Structure of signal molecules
E. Transmembrane transport of signal molecules by receptor molecules

77. The technique known as yeast two hybrid analysis for detecting interacting gene products depend on:
A. activation of DNA polymerase by the nearby binding of hybridizing protein complexes.
B. direct binding of a Gal4p activation domain to a DNA sequence in the promoter region.
C. having a promoter that responds directly to one of the two proteins whose interactions is being measured.
D. hybridization of DNA segments corresponding to the two genes being examined.
E. stimulation of transcription by interaction of two Gal4p domains via fused protein sequences.

78. In DNA sequencing by the Sanger (dideoxy) method:
A. radioactive dideoxy ATP is included in each of four reaction mixtures before enzymatic synthesis

of complementary strands.

B. specific enzymes are used to cut the newly synthesized DNA into small pieces, which are then separated by electrophoresis.
C. the dideoxynucleotides must be present at high levels to obtain long stretches of DNA sequence.
D. the role of the dideoxy CTP is to occasionally terminate enzymatic synthesis of DNA where Gs occur in the template strands.
E. the template DNA strand is radioactive.

79. Which of the following compounds would be most closely associated with the intermediate common to glycogenesis and glycogenolysis?
A. 6-phosphogluconate
B. Glucose-1-phosphate
C. Glucose-6-phosphate
D. Fructose-6-phosphate
E. Dihydroxyacetone phosphate

80. Which of the following enzymes and pathways are correctly matched?
A. Phospholipase D and prostaglandin synthesis
B. HMG-CoA reductase and ketone body synthesis
C. Cyclooxygenase and thromboxane synthesis
D. Ethanolamine kinase and phosphatidylcholine synthesis
E. Phospholipase A_2 and ceramide synthesis.

81. Which of the following is the major site of expression for the monosaccharide transporter GLUT1?
A. erythrocytes, CNS, blood brain barrier
B. liver, pancreatic β-cells, small intestine
C. neurons, testis, placenta
D. skeletal muscle, adipose tissue
E. small intestine, kidney, skeletal muscle, adipose tissue

82. Which of the following is/are the precursor(s) for the amino acid arginine?
A. glutamate, ammonia
B. glutamate
C. phenylalanine
D. methionine, serine
E. glutamine, or glutamate, aspartate

83. Fluroacetate is an inhibitor of aconitase in TCA cycle. Which of the following types of inhibition does fluroacetate belong to?
A. Irreversible inhibition
B. Competitive reversible inhibition
C. Mixed reversible inhibition
D. Uncompetitive reversible inhibition
E. None of the above

84. The complete oxidation of 1 mole of glucose generates about 30-32 moles of ATP synthesized from ADP. What is the reason for 2 moles ATP difference?
A. The reducing equivalent $FADH_2$ is shuttled from cytosol into mitochondria via the dihydroxyacetone phosphate/glycerol-3-phosphate shuttle

B. The reducing equivalent NADH is shuttled from cytosol into mitochondria via the dihydroxyacetone phosphate/glycerol-3-phosphate shuttle
C. The reducing equivalent $FADH_2$ is shuttled from cytosol into mitochondria via the malate/aspartate shuttle
D. The reducing equivalent NADH is shuttled from cytosol into mitochondria via the malate/aspartate shuttle
E. The reducing equivalent ATP is shuttled from cytosol into mitochondria via the malate/aspartate shuttle

85. If glucose labeled with ^{14}C in C-1 were fed to yeast carrying out the ethanol fermentation, where would the ^{14}C label be in the products?
A. In C-1 of ethanol and CO_2
B. In C-1 of ethanol only
C. In C-2 (methyl group) of ethanol only
D. In C-2 of ethanol and CO_2
E. In CO_2 only

86. Which of the following statements concerning the β oxidation of fatty acids is true?
A. About 1,200 ATP molecules are ultimately produced per 20-carbon fatty acid oxidized.
B. One $FADH_2$ and two NADH are produced for each acetyl-CoA.
C. The free fatty acid must be carboxylated in the β position by a biotin-dependent reaction before the process of β oxidation commences.
D. The free fatty acid must be converted to a thioester before the process of β oxidation commences.
E. Two NADH are produced for each acetyl-CoA.

87. Which one of the following statements about the reverse transcriptases of retroviruses and the RNA replicases of other single-stranded RNA viruses, such as R17 and influenza virus, is correct?
A. Both enzymes can synthesize either RNA or DNA from an RNA template strand.
B. Both enzymes can utilize DNA in addition to RNA as a template strand.
C. Both enzymes carry the specificity for the RNA of their own virus.
D. Both enzymes have error rates similar to those of cellular RNA polymerases.
E. Both enzymes require host-encoded subunits for their replication function.

88. Ubiquitin-mediated protein degradation is a complex process, and many of the signals remain unknown. One known signal involves recognition of amino acids in a processed protein that are either stabilizing (Ala, Gly, Met, Ser, etc.) or destabilizing (Arg, Asp, Leu, Lys, Phe, etc.), and are located at:
A. a helix-turn-helix motif in the protein.
B. a lysine-containing target sequence in the protein.
C. the amino-terminus of the protein.
D. a zinc finger structure in the protein.
E. the carboxy-terminus of the protein.

89. Which of the following nonessential amino acids are synthesized from essential amino acids?
A. Glutamate and proline
B. Glutamate and phenylalanine
C. Tyrosine and cysteine
D. Cysteine and proline
E. Methionine and proline

90. Which of the following statements about drugs and inhibitors is TRUE?
   A. Caffeine overdose can prevent sleep because it acts on adenine receptor.
   B. Viagra is used to treat erectile dysfunction because it acts by increasing NO level.
   C. Botulinum toxin is used to diminish facial glabellar lines because it acts by blocking voltage-gated Na^+ channel.
   D. Lovastatin is used for lowering cholesterol because it acts by decreasing low-density lipoprotein level.
   E. Aspirin is used to treat pain and fever because it acts reversibly by suppressing the cyclooxygenase.

111學年度學士後醫學系各科標準答案

學士後醫學系-普通生物及生化概論

試題	第1題	第2題	第3題	第4題	第5題	第6題	第7題	第8題	第9題	第10題	第11題	第12題	第13題	第14題	第15題	第16題	第17題	第18題	第19題	第20題
答案	A	A	E	E	A	E	D	C	A	B	C	D	E	E	D	D	B	A	C	C
試題	第21題	第22題	第23題	第24題	第25題	第26題	第27題	第28題	第29題	第30題	第31題	第32題	第33題	第34題	第35題	第36題	第37題	第38題	第39題	第40題
答案	E	C	A	B	B	C	D	A	D	C	B	A	C	A	A	C	D	E	B	A
試題	第41題	第42題	第43題	第44題	第45題	第46題	第47題	第48題	第49題	第50題	第51題	第52題	第53題	第54題	第55題	第56題	第57題	第58題	第59題	第60題
答案	D	A	D	D	E	D	B	A	B	B	C.E	C	A	D	B	E	C	B	B	E
試題	第61題	第62題	第63題	第64題	第65題	第66題	第67題	第68題	第69題	第70題	第71題	第72題	第73題	第74題	第75題	第76題	第77題	第78題	第79題	第80題
答案	A	D	A	B	E	D	C	A	D	D	D	A	C	C	C	E	E	D	B	C
試題	第81題	第82題	第83題	第84題	第85題	第86題	第87題	第88題	第89題	第90題										
答案	A	E	A	B	C	D	D	C	C	A										

學士後醫學系-物理與化學

試題	第1題	第2題	第3題	第4題	第5題	第6題	第7題	第8題	第9題	第10題	第11題	第12題	第13題	第14題	第15題	第16題	第17題	第18題	第19題	第20題
答案	C	B	E	A	E	B	A	E	E	D	A	C	B	A	D	A	D	B	C	B
試題	第21題	第22題	第23題	第24題	第25題	第26題	第27題	第28題	第29題	第30題	第31題	第32題	第33題	第34題	第35題	第36題	第37題	第38題	第39題	第40題
答案	E	D	D	D	E	E	C	D	C	E	A	C	A	C	D	E	A	A	D	B
試題	第41題	第42題	第43題	第44題	第45題	第46題	第47題	第48題	第49題	第50題	第51題	第52題	第53題	第54題	第55題	第56題	第57題	第58題	第59題	第60題
答案	D	E	B	A	C	A	B	A	C	D	E	D	A	C	C	B	D	A	C	D
試題	第61題	第62題	第63題	第64題	第65題	第66題	第67題	第68題	第69題	第70題	第71題	第72題	第73題	第74題	第75題	第76題	第77題	第78題	第79題	第80題
答案	C	D	A	D	A	B	B	D	A	B	E	C	E	C	A	D	A	C	B	E
試題	第81題	第82題	第83題	第84題	第85題	第86題	第87題	第88題	第89題	第90題										
答案	B	B	A	B	D	B	C	E	A	E										

學士後醫學系-計算機概論與程式設計

試題	第1題	第2題	第3題	第4題	第5題	第6題	第7題	第8題	第9題	第10題	第11題	第12題	第13題	第14題	第15題	第16題	第17題	第18題	第19題	第20題
答案	C	D	D	B	C	A	A	B	C	E	C	A	A	C	D	B	B	B	E	E
試題	第21題	第22題	第23題	第24題	第25題	第26題	第27題	第28題	第29題	第30題	第31題	第32題	第33題	第34題	第35題	第36題	第37題	第38題	第39題	第40題
答案	D	C	A	E	B	E	A	E	A	E	A	B	D	B	D	A	B	B	B	E
試題	第41題	第42題	第43題	第44題	第45題	第46題	第47題	第48題	第49題	第50題	第51題	第52題	第53題	第54題	第55題	第56題	第57題	第58題	第59題	第60題
答案	B	A	A	C	B	D	A	C	E	C	C	D	D	B	E	D	E	C	D	E

試題	第61題	第62題	第63題	第64題	第65題	第66題	第67題	第68題	第69題	第70題	第71題	第72題	第73題	第74題	第75題	第76題	第77題	第78題	第79題	第80題
答案	A	D	D	A	D	A	B	C	C	B	E	C	B	C	B	C	E	C	E	C
試題	第81題	第82題	第83題	第84題	第85題	第86題	第87題	第88題	第89題	第90題										
答案	A	C	B	E	B	A	A	A	A	A										

學士後醫學系- 英文

試題	第1題	第2題	第3題	第4題	第5題	第6題	第7題	第8題	第9題	第10題	第11題	第12題	第13題	第14題	第15題	第16題	第17題	第18題	第19題	第20題
答案	B	B	C	D	D	D	E	B	E	D	B	C	D	B	D	E	A	E	B	B
試題	第21題	第22題	第23題	第24題	第25題	第26題	第27題	第28題	第29題	第30題	第31題	第32題	第33題	第34題	第35題	第36題	第37題	第38題	第39題	第40題
答案	A	A	E	D	D	C	D	E	D	A	B	D	C	B	A	B	D	D	D	E
試題	第41題	第42題	第43題	第44題	第45題	第46題	第47題	第48題	第49題	第50題										
答案	A	B	D	A	A	E	D	C	C	B										