國立成功大學 107 學年度碩士班招生考試試題

系　　所：食品安全衛生暨風險管理研究所

考試科目：生物化學　　考試日期：0206，節次：3

※ 考生請注意：本試題不可使用計算機。　請於答案卷(卡)作答，於本試題紙上作答者，不予計分。

一、選擇題 30 題，每題 2 分 (共 60 分)

1. Mitochondria are associated with all of the following *except*:
A. DNA synthesis.
B. hydrolysis of various macromolecules at low pH
C. protein synthesis.
D. ATP synthesis.
E. apoptosis

2. The correct composition of nucleotide in DNA is:
A. nitrogenous base, phosphate group, deoxyribose.
B. nitrogenous base, ribose, amino group.
C. uracil, phosphate group, deoxyribose.
D. base, ribose, amino group.
E. uracil, phosphate group, ribose

3. Topoisomerase:
A. break only one strand of DNA
B. can create but nor remove supercoils.
C. regulate the level of superhelicity of DNA in cells
D. must hydrolyze ATP for their action.
E. all of the above are correct.

4. All of the following are correct about peptide bond *except*:
A. it exhibits partial double bond character
B. it is planar
C. the nitrogen is attached to the side chain in proline.
D. it is more stable in the *cis* configuration than in *trans* configuration.
E. it has restricted rotation around the carbonyl carbon to nitrogen bond.

5. Protein may be separated according to size by
A. ion exchange chromatography
B. isoelectric focusing
C. reverse-phase HPLC
D. molecular exclusion chromatography

6. Glycoproteins
A. have identical carbohydrate chains
B. are found in cells but not in plasma.
C. may have the carbohydrate protein covalently linked to the protein as an asparagine.
D. that are carbohydrate to hydroxyl linked always have the linkage to hydroxylysine.
E. in plasma membrane, typically have carbohydrate portion on the cytosolic site.

7. Replication:
A. is semiconservative.
B. require a primer in eukaryotes but not in prokaryotes.
C. must begin with an excision step.
D. requires only proteins with DNA polymerase activity.
E. synthesized the complementary strand in the 3' to 5' direction.

8. All of the following statements about telomerase are correct *except*:
A. it is a reverse transcriptase.
B. it added telomeres to the 5'-ends of the DNA strands.
C. it recognizes a G-rich single strand DNA.
D. the RNA component acts as a template for synthesis of a segment of DNA.
E. it provides a mechanism for replicating the ends of the linear chromosomes.

9. One of the DNA repair mechanisms is base excision repair:
A. remove about 10-15 nucleotides
B. recognize the bulky lesion.
C. does not require an endonuclease.
D. is used only for bases that have been deaminated.
E. uses enzymes called DNA glycosylases to generate the abasic sugar site.

10. All of the following are correct about double strand breaks in DNA except:
A. they can lead to loss of genomic information.
B. they can lead to mutations of gene expression.
C. they are always involved in homologous recombination.
D. they are involved in nonhomologous recombination.
E they are associated with a heterodimer in mammals.

11. Methylation of bases in DNA usually:
A. inactivates DNA for transcription.

B. facilitates the binding of transcription factors to the DNA.
C. makes a difference in activity only if it occurs in an enhancer region.
D. prevents chromatin from unwinding.
E. results in increased production of mRNA.

12. The TATA sequence:
A. occurs about 25 bp downstream from the start of transcription.
B. binds directly to RNA polymerase.
C. binds transcription factor which bind RNA polymerase.
D. binds p53.
E. is an enhancer sequence.

13. Formation of mature insulin includes all of the following *except*:
A. removal of a signal peptide.
B. folding into a three-dimentional structure.
C. formation of disulfide bond.
D. removal of a peptide from an internal region.
E. γ-carboxylation of glutamate residues.

14. Haptens:
A. can function as antigens.
B. strongly bind to antibodies specific for them.
C. maybe macromolecules.
D. never act as antigen determinants.
E. can directly elicit the production of specific antibodies.

15. All of the following statements about immunoglobulins are correct *except*:
A. they are four polypeptide chains
B. there are two copies of each type of chain.
C. all chains are linked by disulfide bonds
D. carbohydrate is covalently bound to the protein.
E. immunoglobulin class in determined by the C_L regions.

16. Although enzyme catalysis is reversible, a given reaction may appear irreversible:
A. if the products are thermodynamically for more stable than the reactants.
B. under equilibrium conditions.
C. if a product accumulates.

D. at high enzyme concentrations.
E. at high temperatures.

17. Most allosteric enzymes:
A. are monomers.
B. have more than two subunits.
C. exhibit only homotropic interactions
D. exhibit only hetertropic interactions
E. have no effects on binding other ligands.

18. Cell membranes typically:
A. contain free carbohydrate such as glucose.
B. contain cholesteryl esters.
C. are about 90% phospholipid.
D. have integral and peripheral proteins.
E. contain large amounts of triacetylglycerols.

19. The inner mitochondria membrane contains a transporter for:
A. NADH
B. acetyl CoA
C. ATP
D. glucose
E. GTP

20. The energy yield in molecules of ATP per glucose monomer converted to lactate from glycogen via glycogen breakdown and glycolysis is
A. 36 ATP
B. 12 ATP
C. 8 ATP
D. 2 ATP
E. 0 ATP

21. The first intermediate of TCA cycle is
A. citrate
B. pyruvate
C. succinate
D. malate

E. fumarate

22. Which of the following enzyme did not take part in TCA cycle?
A. Aconitase
B. citrate synthesis
C. malate dehydrogenase
D. pyruvate dehydrogenase
E. fumarase

23. Which of the following supports glucogenesis?
A. pyruvate+ATP+$HCO3^-$ ⇄ oxaloacetate + ADP + Pi + H^+
B. acetyl CoA + oxaloacetate + H2O ⇄ citrate + CoA
C. leucine degradation
D. lysine degradation
E. α-ketoglutarate + aspartate ⇄ glutamate + oxaloacetate

24. β-oxidation of fatty acids:
A. generate ATP if acetyl CoA is subsequently oxidized.
B. is usually suppressed in starvation.
C. uses only saturated fatty acids as substrates.
D. used $NADP^+$.
E. occurs by a repeated sequence of four reactions.

25. Roles of various phospholipid include all of the following *except*:
A. a surfactant function in lung.
B. activation of certain membrane enzymes.
C. signal transduction.
D. cell-cell recognition
E. mediators for inflammatory reactions.

26. Cholesterol present in low density lipoprotein:
A. once in the cell is converted to cholesteryl esters by cholesterol acyl transferase.
B. once in the cell, suppresses activity of acetyl-CoA cholesterol acyl transferase.
C. binds to a cell receptor and diffuses across the cell membrane.
D. represents primarily cholesterol that is being removed from peripheral cells.
E. once it has accumulated in the cell, inhibits replenishment of LDL.

27. Cholesterol synthesis:
A. cholesterol levels are largely maintained by liver.
B. the rate limiting step in cholesterol synthesis is β-oxidation
C. cholesterol synthesis occurs in ER and mitochondria.
D. the first intermediate of cholesterol synthesis is acetyl CoA
E. cholesterol is a precursor of uric acid.

28. Glutathione does all of the following *except*:
A. participates in the anti-inflammatory reaction.
B. oxidized to GSSG.
C. decreases the stability of erythrocyte membranes.
D. acts a cofactor for some enzyme.
E. form conjugates with some drugs to increase water solubility.

29. Uric acid is:
A. a degradation product of amino acid.
B. form from xanthine in the presence of O_2.
C. deficiency in gout.
D. a competitive inhibitor of xanthine oxidoreductase.
E. oxidized, in human, before it is excreted in urine.

30. In the interaction of a hormone with its receptor, all of the following are true *except*:
A. more than one polypeptide chain of the hormone maybe necessary.
B. more than one second messenger may be generated.
C. an array of transmembrane helices may form the binding site for the hormone.
D. receptors have greater affinity for hormones than for synthetic agonists or antagonists.
E.hormone could interact with a nuclear receptor.

二、問答題 (3 題，共 40 分):

31. Please describe the reaction of electron transport chain (15 分).

32. Please describe the following composition and take an example for each: (1) monosaccharides (5 分), (2) disaccharides (5 分), (3) polysaccharides (5 分). (總共 15 分)

33. What are five major lipoproteins? (10 分)