

※ 考生請注意：本試題不可使用計算機 請勿在本試題紙上作答，否則不予計分

1. 單選題 Please choose the correct answer (only one answer) for each question
(2% for No.1-15, 3% for No.16-25; total 60%).
- Which of these can cross the inner membrane of mitochondria?
(A) Fatty acyl-CoA
(B) Acetyl-CoA
(C) Fatty acyl-carnitine
(D) Acetyl-ACP
 - Which of the following is true for glycogen synthase?
(A) The conversion of an active to an inactive form of enzyme is controlled by the concentration of cAMP
(B) Inactivation of the enzyme involves a phosphorylation
(C) It can convert glycogen to monosaccharide.
(D) It is measurable in muscle.
 - A fatty acid represented as $\text{CH}_3\text{CH}_2\text{CH}=\text{CH}-\text{R}$, where R is a hydrocarbon chain with a terminal COOH, belongs to
(A) a 3,4-trans unsaturated fatty acid
(B) a polyunsaturated fatty acid
(C) an acetyl-CoA
(D) an omega-3 fatty acid
 - Phosphofructokinase is one of the enzymes in glycolysis. The most significant inhibitors of phosphofructokinase are
(A) citrate and ATP
(B) ADP and acetyl-CoA
(C) fructose-2,6 bisphosphate and ADP
(D) ATP and ADP
 - Tyrosine is not one of the essential amino acids because it can derive from
(A) tyrosine hydroxylase
(B) tyrosinase
(C) tyrosine hydroxylase
(D) phenylalanine via phenylalanine hydroxylase
 - Which of the following is an inhibitor of RNA synthesis?
(A) Tetracycline
(B) Chloramphenicol
(C) Cycloheximide
(D) Actinomycin D
 - Which of the following amino acid has NOT been found covalently linked to the glycan moiety on a glycoprotein?
(A) Ser
(B) Thr
(C) Asn
(D) Arg
 - Which of the following amino acid has NOT been found covalently linked to the phosphoryl group on a phospho-protein?
(A) Thr

- (B) Arg
(C) Ser
(D) Tyr
9. Which of the following hormones that does NOT tend to increase the level of blood glucose?
(A) Epinephrine
(B) Cortisol
(C) Insulin
(D) Glucagon
10. Which of the following metabolic pathways consumes ATP molecules?
(A) Pentose phosphate pathway
(B) Gluconeogenesis
(C) Oxidative phosphorylation
(D) Beta-oxidation of fatty acids
11. Which of the following substrates is NOT used in glycogenesis?
(A) Lactate
(B) Glycerol
(C) Malate
(D) Pyruvate
12. Which of the following molecules is NOT considered as an amphipathic molecule?
(A) Cholesterol
(B) Glycolipid
(C) Phospholipid
(D) Triacylglycerol
13. Which of the following molecules is able to cross the inner mitochondrial membrane?
(A) Fatty acyl-carnitine
(B) Acetyl-CoA
(C) Fatty acyl-CoA
(D) Malonyl-CoA
14. Which organelle contains the enzyme that can convert glycolate to glyoxylate?
(A) Mitochondria
(B) Peroxisome
(C) Chloroplast
(D) Lysosome
15. Which of the following amino acids does NOT account for the UV high absorbance of proteins at 280 nm?
(A) Phe
(B) Tyr
(C) Trp
(D) His

16. Beta-sheets are stabilized by which of the force?
(A) Van der Waals force
(B) hydrogen bonds are formed between adjacent polypeptide chain
(C) covalent bonds are formed between adjacent polypeptide chain
(D) ion pair
17. Which of the following amino acids can possess the neurotransmitter in vivo?
(A) Phenylalanine
(B) Glutamic acids
(C) Methionine
(D) Alanine
18. Ubiquitin is a _____ and can be conjugated to protein through _____ process.
(A) amino acid, an ATP- and Mg^{2+} -dependent
(B) polypeptide, an ATP- dependent
(C) protein, an ATP- and Mg^{2+} - independent
(D) glycan, an ATP- dependent and Mg^{2+} - independent
19. Which of the following amino acids, whose amino group will end up as part of urea, reacts with citrulline in the Urea cycle?
(A) Asn
(B) Asp
(C) Glu
(D) Gln
20. Which of the following fatty acids has the highest melting temperature?
(A) 14:0
(B) 14:1
(C) 16:0
(D) 16:1
21. HDL does NOT contain which of the following apolipoprotein?
(A) apo A-I
(B) apo B-100
(C) apo C-I
(D) apo E
22. The ATP-citrate lyase is located in _____ and participates in the biosynthesis of fatty acid
(A) mitochondria
(B) lysosome
(C) nucleus
(D) cytosol
23. Prostaglandin and leukotriene are converted from arachidonic acid by ___ and ___, respectively.
(A) cyclooxygenase, lipoxygenase
(B) lipoxygenase, cyclooxygenase
(C) HMG-CoA reductase, cyclooxygenase
(D) phospholipase, cyclooxygenase

24. Which of the following enzymes does NOT participate in mammalian DNA replication?
- (A) minichromosome maintenance (MCM) protein
 - (B) replication factor C (RFC)
 - (C) Proliferating Cell Nuclear Antigen (PCNA)
 - (D) DNA gyrase
25. Which of the following enzymes or molecules does NOT involve in splicing of introns in nuclear mRNA primary transcripts?
- (A) Endonucleases
 - (B) RNA helicase
 - (C) SnRNPs
 - (D) ATP
- II. 複選題 Please choose the correct answers for each question (20%)
26. Transcription factors can bind to _____.
- (A) DNA promoters
 - (B) DNA enhancers
 - (C) DNA operators
 - (D) DNA repressors
27. Which of the following codons are chain terminating codons in protein synthesis?
- (A) UAG
 - (B) UAA
 - (C) UGA
 - (D) UAU
28. Which of the following description are TRUE?
- (A) HMG-CoA reductase catalyzes biosynthesis of mevalonate.
 - (B) The committed step in cholesterol biosynthesis is catalyzed by HMG-CoA reductase.
 - (C) Chylomicron plays an essential role in the transport of *de novo* biosynthetic triglycerides from liver to tissue.
 - (D) VLDL plays an essential role in the transport of dietary lipids to tissue.
29. Which of the following description are TRUE?
- (A) Galactose utilization involves biotransformation of G-6-P first and then G-1-P.
 - (B) Breakdown of glycogen requires glycogen phosphatase.
 - (C) Hexokinase, glucose-6-phosphate isomerase and fructose-6-phosphatase can convert glucose into fructose.
 - (D) Fructose-1-phosphate is the main product of fructokinase.
30. Which of the following description are TRUE?
- (A) Thymidylate synthase synthesizes dTMP from dUMP by methylation utilizing the coenzyme THF.
 - (B) CMP, UMP and TMP all have aspartate as a common precursor.
 - (C) Histones are acidic proteins that are usually associated with DNA.
 - (D) Exonucleases degrade DNA direction by either 5'→3' or 3'→5'.

III. 解釋名詞 Please explain the following biological terms :

1. Posttranslational modifications (4%)
2. Posttranscriptional modifications (4%)
3. Restriction enzymes (2%)

IV. 簡答題 Please answer the following questions:

4. Which factors can affect the melting point (T_m) of DNA? (2%)
5. What does a protein kinase do to its substrate? (1%) Give two examples of protein kinases in the signal transduction? (3%)
6. What are the roles of lecithin and ATP binding cassette transporter-A1 (ABC-A1) in reverse cholesterol transport? (4%)