試題之答案選項 abcde，請對應畫 記於答案卡之 ABCDE。

Single choice (2.5% each)

1. Which following reaction will physiologically couple with generation of an ATP from an ADP?

(a) pyruvate→phosphoenolpyruvate (b) Glycerol 3-phosphate→glycerol
(c) pyrophosphate→phosphate (d) 1,3-Bisphosphoglycerate→3-phosphoglycerate
(e) pyruvate→oxaloacetate.

2. Cytochromes P450 play important roles in detoxification and biosynthesis of steroid hormones from cholesterol. Which component is not required for cytochrome P450 hydroxylase cycle in microsomes of the adrenal cortex?

(a) $NADPH/NADP^+$ (b) $FADH_2/FAD$ (c) selenium (d) O_2 (e) reductase.

3. Glycine is one of nonessential amino acids. Please find a compound which is not important for this amino acid biosynthesis?

(a) asparagine (b) glutamate (c) glyoxylate (d) serine (e) choline.

4. In the transfer of bilirubin from blood to bile, how many glucuronides will be conjugated with one bilirubin molecule in hepatocyte for secretion to bile ductile?

(a) 1 (b) 2 (c) 4 (d) 6 (e) 8.

5. A peptide has the sequence Acetyl-Ala-Glu-His-Ser-Lys-Gly-amide, This oligopeptide has a pI close to

(a) 4.3 (b) 5.1 (c) 6.0 (d) 8.4 (e) 10.8

6. The oxygen-binding curve of hemoglobin is sigmoidal because

(a)The binding of oxygen to a heme group increases the oxygen affinities of the other heme groups.
(b)The heme groups of the α chains have a higher oxygen affinity than do the heme groups of the β chains
(c)The distal histidine allows the hemoglobin molecule to change its conformation in response to an elevated carbon dioxide concentration.
(d) The subunits are held in place by interchain disulfide bonds.
(e) The solubility of the hemoglobin molecule changes with its oxidation state.

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7. β-sheets are stabilized by which of the force?
(a) hydrophobic interaction (b) vanderwall force
(c) hydrogen bonds are formed between adjacent segments of polypeptide chain
(d) hydrogen bonding between the R groups (e) ionic interaction.

8. The component of a water-soluble globular protein that is most likely to be present in the center of the molecule rather than on its surface is
(a) A glutamate side chain (b) A histidine side chain (c) A phenylalanine side chain
(d) A phosphate group covalently linked to a serine side chain.
(e) An oligosaccharide covalently linked to an aspargine side chain.

9. Degeneracy of the genetic code denotes the existence of :
(a) multiple codons for a single amino acid (b) codon consisting of 2 bases
(c) a given codon codes for different amino acids
(d) codons that include one or more of the "unusual" bases.
(e) codon containing a break

10. Which statement is NOT TRUE regarding the accuracy of protein synthesis?
(a) The ribosome contains an exopeptidase for proofreading
(b) Aminoacyl-tRNA synthetases hydrolyze incorrect amino acyl-tRNA^{aa}
(c) The error rate in protein synthesis is about 1 in 10,000
(d) tRNA binding to aminoacyl tRNA synthetase is highly specific
(e) Codon-anticodon interactions ensure that correct tRNA s enter the A site.

11. Coactivator protein influence eukaryotic gene expression by
(a) binding to TATA box
(b) interacting with RNA polymerase directly to enhance transcription
(c) bridging activators with TBP.
(d) binding to *cis*-element in the promoter region.
(e) Enhancing deacetylation of histone 2.

12. Which of the following RNA has the highest percentage of modified bases
(a) mRNA (b) rRNA (c) tRNA (d) hnRNA (e) Mitochondrial RNA

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13. Which vitamins are precursors of coenzyme A (CoA) and nicotinamide adenine dinucleotide (NAD) that used in the TCA cycle.
(a) pantothenic acid and niacin (b) thiamin and niacin
(c) thiamin and riboflavin (d) riboflavin and pantothenic acid
(e) niacin and riboflavin

14. What is the end product of glycolysis in erythrocytes?
(a) phosphoenolpyruvate (b) 3-phosphoglycerate (c) lactate
(d) glycogen (e) pyruvate

15. Glycolysis is regulated by three enzymes catalyzing nonequilibrium reactions, which of the following enzyme **is not** included.
(a) hexokinase (b) pyruvate kinase (c) lactate dehydrogenase
(d) phosphofructokinase (e) glucokinase

16. Which of the following description **is not** correct.
(a) Maltose is one of the important disaccharides.
(b) Pyruvate kinase deficiency in red blood cells causes hemolytic anemia.
(c) Number of ATP formed per mole of glucose under aerobic conditions in red blood cells is 38.
(d) Pyruvate is oxidized to acetyl-CoA by pyruvate dehydrogenase.
(e) In the case of glucose in solution, more than 99% is in the pyranose form.

17. Which of the following amino acids is not the precursor of hormones or neurotransmitters?
(a) serine (b) tyrosine (c) histidine (d) tryptophan (e) arginine

18. Which of the following compounds is not second messengers?
(a) cGMP (b) cAMP (c) nitric oxide (d) diacylglycerol (e) inositol triphosphate

19. Which of the following proteins is not involved in insulin signaling?
(a) Ras (b) SOS (c) IRS-1 (d) STAT (e) MAPK

20. Which of the following lipids is not the precursor of cytokines or hormones?
(a) arachidonate (b) palmitate (c) sphingomyelin (d) vitamin A (e) cholesterol

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21. Which one of the following statements about the history of enzymes is **not** correct?
(a) Pasteur (1850) concluded that fermentation of sugar into alcohol by yeast is catalyzed by ferments (vitalism).
(b) Büchner (1897) used yeast cell-free system to convert sugar into alcohol and Kuhne called these ferments enzymes.
(c) Sumner (1926) isolated and crystallized urease and postulated that enzymes are proteins.
(d) Northrop and Kuniz further crystallized pepsin, trypsin etc. and Sumner's postulation was accepted.
(e) Haldane suggested that strong-bonding interactions between an enzyme and its substrate distorted the substrate and thus catalyzed a reaction.

22. Lyases are enzymes for
(a) transfer of hydride ion or groups
(b) transfer groups within molecules to yield isomeric forms.
(c) transfer of functional groups to water.
(d) formation of double bonds by removal of groups.
(e) formation of C-N, C-O, C-C and C-S bonds.

23. Which one of the following statements about enzyme inhibitions is **not** correct?
(a) The study of enzyme inhibitors provided valuable information about enzyme mechanisms and helped define metabolic pathways.
(b) Some enzyme inhibitors are among the most important pharmaceutical agents known.
(c) Enzyme inhibitors can be reversible and irreversible.
(d) The reversible inhibitors affect the chemical modification of amino acid residues at the active site.
(e) In the presence of substrate or product, they often protect the inhibitors targeting the active site.

24. Which one of the following statements about the enzyme reaction mechanisms is **not** correct?
(a) In contrast to organic catalysis, enzymes exhibit a low order of substrate specificity and catalytic efficiency.
(b) The pathways, by which enzymes convert substrates to products, involve a succession of enzyme-substrate intermediates.
(c) The goal of mechanistic studies is to identify the rate-limiting step, amino acid residues at the active site, and the enzyme-substrate intermediates.
(d) The mechanistic studies can lead to a rational approach to therapy and drug design.
(e) The techniques of site-directed mutagenesis can facilitate the design and introduction into humans of enzymes with specific desired properties.

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25. A protein whose expression is needed in very large amounts for very short period sof time only, such as the oncogene product c-Fos, might be expected:
(a) to be present on a plasmid; (b) to have a highly stable mRNA;
(c) to be encoded in multiple copies; (d) to have a very unstable mRNA;
(e) to be composed of multiple subunits.

26. Anti-sense RNAs are thought to repress gene expression by:
(a) binding to promoters and excluding positively-acting transcription factors;
(b) binding to complementary sites in mRNA and interfering with their translation into protein;
(c) encoding anti-proteins which inhibit the function of their cognate proteins;
(d) binding to complementary sequences in DNA and preventing their transcription;
(e) competing for the cell's transcriptional machinery.

27. RNA editing is the process whereby:
(a) introns are removed from precursor RNAs;
(b) polyA tails are added to nascent RNAs;
(c) the primary nucleotide sequence of the RNA is altered posttranscriptionally;
(d) the RNA is decoded into protein; (e) the RNA is capped.

28. An aminoacyl t-RNA synthetase enzyme must:
(a) recognize different m-RNA molecules; (b) recognize a particular amino acid;
(c) distinguish 40s from 60s ribosome subunits;
(d) bind to the anticodon site of a t-RNA molecule by complementary base pairing;
(e) all of the above.

29. The hydroxylation of proline and lysine in tropocollagen polypeptide chains does not require which of the following?
(a) O2 (b) specific dioxygenases (c) ascorbate (d) pyridoxal phosphate
(e) α-ketoglutarate

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30. Why does hydroxylation increase the stability of the collagen triple helix?
(a) It promotes hydrogen bonding with water.
(b) It increases hydrogen bonding between polypeptide chains.
(c) It expands the helix and allows the glycine residues to fit better in the interior.
(d) It decreases the melting temperature of tropocollagen.
(e) It neutralizes the charge on lysine residues.

31. Which of the following statements about collagen gene is incorrect?
(a) All the collagen genes in an organism are identical; the diversity of collagens arises only from post-translational modifications.
(b) Each gene contains about 50 exons.
(c) Each gene likely evolved by duplication of an ancestral 54-bp exon.
(d) Each gene encodes repeated Gly-X-Y sequences that correspond to the helical regions of collagen.

32. A transmissible or infectious drug-resistance plasmid can be created when
(a) an γ-gene integrates into an R-factor plasmid bearing a resistance transfer factor(RTF).
(b) an R-factor plasmid loses several γ-genes.
(c) a RTF plasmid integrates into the chromosome of its host bacterium.
(d) a simple R-factor plasmid excises from the host bacterial chromosome.

33. The structure of the trans-oleic acid is similar to
(a) cis-oleic acid (b) stearic acid (c) linoleic acid (d) α-linolenic acid
(e) γ-linolenic acid

34. Which of the following is not a component of high density lipoprotein (HDL)?
(a) Apo A-I (b) Apo B-48 (c) Apo E (d) triacylglycerol
(e) cholesteryl ester

35. In animals, a double bond can not be introduced into fatty acid at position
(a) Δ^4 (b) Δ^5 (c) Δ^6 (d) Δ^9 (e) Δ^{12}

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36. HMG-CoA reductase is not inhibited by

(a) acetoacetyl-CoA (b) bile acid (c) cholesterol (d) mevalonate

(e) simvastatin

37. RNA is degraded by alkaline condition. Which of the following is a hydrolysis product of the polynucleotide 5'-AGACUC-3' in alkaline solution?

(a) pAp (b) pGp (c) pC (d) pU (e) pG

38. A human double stranded DNA fragment contains 55 % of G plus C. The T content is

(a) 17.5% (b) 22.5% (c) 25% (d) 30% (e) 32.5%

39. How many grams of maltose are needed to prepare 100 ml of 0.8 M maltose solution?

(a) 14.4 (b) 27.26 (c) 28.8 (d) 54.52 (e) 80

40. The pH value of phosphate buffer closes to

(a) 4 (b) 5 (c) 6 (d) 7 (e) 8

試題隨卷繳回