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國立臺灣大學 109 學年度碩士班招生考試試題

科目： 生物化學(一般生物化學)

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1. Which below wavelength is commonly used to detect aromatic amino acids?
 - A) 230nm
 - B) 260nm
 - C) 280nm
 - D) 320nm
 - E) 488nm

2. Which α -carbon bonded group in cysteine functions as a nucleophile?
 - A) -H group
 - B) Amino-group
 - C) Carboxyl-group
 - D) SH-group
 - E) -OH group

3. Which below amino acid cannot be modified by phosphorylation?
 - A) Serine
 - B) Tyrosine
 - C) Histidine
 - D) Threonine
 - E) Alanine

4. Which below method cannot be used to disrupt cells for protein purification?
 - A) Cell lysis
 - B) French press
 - C) Enzyme digestion
 - D) Grinding
 - E) Centrifugation

5. Which of the following enzymes possesses both RNA-dependent DNA polymerase and DNA-dependent DNA polymerase activities?
 - A) DNA polymerase I
 - B) DNA polymerase II
 - C) DNA polymerase III
 - D) Klenow fragment
 - E) Reverse transcriptase

6. Which of the following polymerase synthesizes 5S rRNA?
 - A) RNA polymerase I
 - B) RNA polymerase II
 - C) RNA polymerase III
 - D) Telomerase
 - E) Reverse transcriptase

見背面

7. Which of the following enzymes is a ribozyme?
- A) RNase A
 - B) RNase D
 - C) RNase H
 - D) RNase P
 - E) RNase III
8. Which of the following factors is critical for the maintenance of lysogenic state of lambda phage?
- A) Cro protein
 - B) Lambda repressor
 - C) N protein
 - D) Q protein
 - E) Sigma factor
9. The expression of kappa light chain of antibodies is controlled by which of the following gene regulations?
- A) Gene deletion
 - B) Gene translocation
 - C) Gene amplification
 - D) Gene conjugation
 - E) Gene insertion
10. Which of the following templates is NOT a substrate for polymerase chain reaction (PCR)?
- A) Double strand DNA
 - B) Single strand DNA
 - C) Circular form of DNA
 - D) mRNA
 - E) Plasmid DNA.
11. At replication forks in *E. coli*:
- A) DNA helicases make endonucleolytic cuts in DNA.
 - B) DNA primers are degraded by exonucleases.
 - C) DNA topoisomerases make endonucleolytic cuts in DNA.
 - D) RNA primers are removed by primase.
 - E) RNA primers are synthesized by primase.
12. The function of the eukaryotic DNA replication factor PCNA (*proliferating cell nuclear antigen*) is similar to that of the β -subunit of bacterial DNA polymerase III in that it:
- A) facilitates replication of telomeres.
 - B) increase the processivity of replication.
 - C) has a 3' \rightarrow 5' proofreading activity.
 - D) increases the speed but not the processivity of the replication complex.
 - E) participates in DNA repair.

13. Which of the following statements regarding plasmid cloning vectors is correct?
- A) Circular plasmids do not require an origin of replication to be propagated in *E. coli*.
 - B) Foreign DNA fragments up to 45,000 base pairs can be cloned in a typical plasmid.
 - C) Plasmids do not need to contain genes that confer resistance to antibiotics.
 - D) Plasmid vectors must carry promoters for inserted gene fragments.
 - E) The copy number of plasmids may vary from a few to several hundred.
14. In homologous recombination in *E. coli*, the protein that assembles into long, helical filaments that coat a region of DNA is:
- A) RecA protein.
 - B) RecBCD enzyme.
 - C) DNA methylase.
 - D) DNA polymerase.
 - E) Histone.
15. Apolipoprotein AI (Apo-AI) deficiency is associated with
- A) low plasma total cholesterol
 - B) high plasma total cholesterol
 - C) high plasma triacylglycerol
 - D) low plasma LDL-cholesterol
 - E) low plasma HDL-cholesterol
16. Which of the following is not required for synthesis of arachidonic acid (C20:4, n-6) from linoleic acid (C18:2, n-6)?
- A) Δ^4 -desaturase
 - B) Δ^5 -desaturase
 - C) Δ^6 -desaturase
 - D) Elongase
 - E) Malonyl-CoA
17. Which enzyme is the key enzyme for bile acid biosynthesis?
- A) Acetyl-CoA carboxylase
 - B) 7α -hydroxylase
 - C) HMG-CoA reductase
 - D) HMG-CoA lyase
 - E) Acyl-CoA synthetase
18. Which of the following is responsible for the generation of LDL from VLDL?
- A) HMG-CoA reductase
 - B) HMG-CoA lyase
 - C) Hormone sensitive lipase
 - D) Lipoprotein lipase
 - E) Pancreatic lipase

見背面

19. What molecule is it that provides 8 electrons for nitrogen fixation?
- A) Glucose
 - B) Oxaloacetate
 - C) Pyruvate
 - D) Acetyl-coA
 - E) ATP
20. What enzyme is it that mediates nitrogen entry into higher organisms?
- A) Glutamine synthetase
 - B) Glutamate-pyruvate transaminase
 - C) Carbamoyl phosphate synthetase I
 - D) Arginase
 - E) N-acetylglutamate synthase
21. Which transporting protein is it that works via secondary active transport mechanism?
- A) Ionophore
 - B) Ion channel
 - C) Uniporter
 - D) Symporter
 - E) Pump
22. Which of the phospholipid is more abundant in the outer membrane of a lipid bilayer?
- A) Phosphatidylserine
 - B) Phosphatidylcholine
 - C) Phosphatidylinositol
 - D) Phosphatidylethanolamine
 - E) Phosphatidic acid
23. What following component cannot be a cofactor for a dehydrogenase?
- A) NADP⁺
 - B) NAD⁺
 - C) FAD
 - D) Copper
 - E) FMN.
24. How many following enzyme(s) in the list can generate a product of glucose? (i) Phosphorylase, (ii) Phosphoglucomutase, (iii) Glucose 6-phosphatase, (iv) Fructose 2,6-bisphosphatase, (v) Debranching enzyme.
- A) 1
 - B) 2
 - C) 3
 - D) 4
 - E) 5

25. Which following component can directly inhibit phosphofructokinase?
- A) Fructose 2,6-bisphosphate
 - B) Fructose 6-phosphate
 - C) Citrate
 - D) Malate
 - E) Alanine.
26. What amino acid is responsible for the generation of proline in human cells?
- A) Serine
 - B) Lysine
 - C) Phenylalanine
 - D) Asparagine
 - E) Glutamate.
27. What must happen in order to prevent overstimulation by a hormone?
- A) Hormones must be degraded.
 - B) G-proteins must be recycled and then degraded.
 - C) Receptors must be blocked from continuing to activate G-proteins.
 - D) Receptors must dimerize.
 - E) All of above.
28. Which of the following hormones termed the "flight-or-fight" hormone is secreted by the adrenal medulla?
- A) Epinephrine
 - B) Oxytocin
 - C) Insulin
 - D) Glucagon
 - E) Somatostatin
29. Which hormone is secreted by alpha cells in the pancreas in response to low blood glucose levels?
- A) Insulin
 - B) Glucagon
 - C) Estradiol
 - D) Epinephrine
 - E) Somatostatin
30. In liver cells, the expression of genes encoding gluconeogenic enzymes such as phosphoenolpyruvate carboxykinase is induced in response to which of the following molecules?
- A) cGMP
 - B) Insulin
 - C) ATP
 - D) cAMP
 - E) Cholesterol

31. Which of the following amino acids is required for conversion of inosine monophosphate (IMP) to adenylosuccinate en route to adenosine monophosphate (AMP)?
- A) Aspartate
 - B) Glutamine
 - C) Glycine
 - D) Glutamate
 - E) Asparagine.
32. Which of the following descriptions about small noncoding regulatory RNAs is RIGHT?
- A) siRNAs are frequently used to knock-out specific protein levels
 - B) miRNAs are double stranded
 - C) miRNAs can cause translational repression, mRNA destabilization and mRNA degradation
 - D) All are right
 - E) All are wrong.
33. Which of the following molecules is an intermediate in the catabolism of adenine and guanine?
- A) Hypoxanthine
 - B) Xanthine
 - C) Uric acid
 - D) All are right
 - E) All are wrong.
34. In the urea cycle, which of the following enzymes is in the matrix of liver mitochondria to catalyze reactions?
- A) Arginase
 - B) Argininosuccinate synthase
 - C) Argininosuccinate lyase
 - D) Carbamoyl phosphate synthase I
 - E) All of them.
35. A 36-year-old man is diagnosed with Arsenic poisoning, that inhibits which of the following enzymes of TCA cycle?
- A) Citrate synthase
 - B) Malate dehydrogenase
 - C) Aconitase
 - D) α -ketoglutarate dehydrogenase
 - E) None of the above
36. During strenuous exercise, the most important reaction involved in the reoxidation of NADH is:
- A) dihydroxyacetone phosphate \rightarrow glycerol 3-phosphate
 - B) glucose 6-phosphate \rightarrow fructose 6-phosphate
 - C) isocitrate \rightarrow α -ketoglutarate
 - D) pyruvate \rightarrow lactate
 - E) None of the above

37. Which of the following statements about the TCA cycle is correct?
- A) Oxygen is used to oxidize the acetyl group carbons of acetyl-CoA in the TCA cycle.
 - B) Three molecules of NADH and one molecule of FADH₂ are produced in one turn of the TCA cycle.
 - C) Oxygen is not used in the TCA cycle, so the cycle can occur in anaerobic conditions.
 - D) The TCA cycle produces the water that is formed during the complete oxidation of glucose.
 - E) None of the above
38. In what form does the product of glycolysis enter the TCA cycle?
- A) Pyruvate
 - B) Acetyl-CoA
 - C) NADH
 - D) Glucose
 - E) None of the above
39. In prokaryotic translation initiation, start codon forms base pairs with which molecule :
- A) 16S rRNA.
 - B) Shine-Dalgarno sequence.
 - C) IF-2-GTP.
 - D) fMet-tRNA^{fMet}
 - E) 23S rRNA.
40. For targeting proteins to endomembrane system, signal sequences are recognized by:
- A) Proteasome.
 - B) Importin.
 - C) Ribosome.
 - D) Ion channels.
 - E) SRP.
41. What kind of mutation at protein-coding regions of genome can cause a frame shift in translation:
- A) A single nucleotide insertion.
 - B) A nonsense mutation.
 - C) A missense mutation.
 - D) A silent mutation.
 - E) Initiation failure.
42. Which molecule can promote translocation in translation elongation?
- A) EF-Ts.
 - B) NES.
 - C) EF-G.
 - D) EF-Tu.
 - E) eIF-4.

43. The amino acid glycine is known as an α -helix breaker. Thus, a glycine-rich sequence should NOT form an α -helix, why?
- A) Glycine cannot form the typical $i \rightarrow i+4$ hydrogen bond.
 - B) The side-chain of glycine is too large.
 - C) Glycine is structurally the most flexible amino acid.
 - D) The side-chain of glycine is negatively charged.
 - E) Glycine is too hydrophobic
44. Enzymes increase reaction rates by....
- A) binding tightly to substrate
 - B) increasing the ΔG° of a reaction
 - C) decreasing the ΔG° of a reaction
 - D) increasing the activation energy of a reaction
 - E) decreasing the activation energy of a reaction
45. Which statement regarding protein structure is NOT correct?
- A) The tertiary structure of a protein is specified by its primary structure.
 - B) The tertiary structures of most proteins are heat-resistant.
 - C) The formation of protein tertiary structure can be assisted by chaperones.
 - D) The majority of protein tertiary structures are stabilized by non-covalent interactions.
 - E) An α -helix may undergo conformational change to become a β -sheet.
46. Lyases are enzymes capable of catalyzing....
- A) breakage of chemical bonds
 - B) hydrolysis of chemical bonds
 - C) phosphorylation reaction
 - D) the conversion of ATP into ADP
 - E) isomerization of chemical bonds
47. Which enzyme is involved in cis Golgi oligosaccharides processing
- A) N-acetyl glucosaminyltransferase I
 - B) N-acetyl glucosaminyltransferase II
 - C) Golgi apparatus alpha mannosidase
 - D) Oligosaccharide:protein transferase
 - E) Fucosyltransferase
48. Which integrin can bind to I-CAM involved in leukocyte trans endothelial cell layer during the inflammation.
- A) $\alpha 1 \beta 2$
 - B) $\alpha 2 \beta 1$
 - C) $\alpha 3 \beta 1$
 - D) $\alpha 6 \beta 1$
 - E) $\alpha v \beta 3$

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49. The following glycosaminoglycans which one is without protein core
- A) Heparan sulfate
 - B) Dermatan sulfate
 - C) Heparin
 - D) Chondroitin sulfate
 - E) Keratan sulfate
50. Which description about cell death is not right
- A) Basement membrane is required for cell survival call anchorage-independent growth
 - B) Apoptosis is the only one type of cell death
 - C) Cytochrome C releasing is critical for caspase-3 activation
 - D) Caspase-3 activation need the proteolytic cleave procaspase-3
 - E) A) and B) are not right

試題隨卷繳回