

※單選題 每題2分

※ 注意：請用 2B 鉛筆作答於答案卡，並先詳閱答案卡上之「畫記說明」。

1. Which of the following statements about regulation of the lac operon is true?
 - A) Glucose in the growth medium does not affect the inducibility by lactose.
 - B) Glucose in the growth medium decreases the inducibility by lactose.
 - C) Glucose in the growth medium increases the inducibility by lactose.
 - D) Its expression is regulated mainly at the level of translation.
 - E) The lac operon is fully induced whenever lactose is present.

2. Which one of the following is *not* involved in steroid hormone action?
 - A) Transcription activation and repression
 - B) Hormone-receptor complexes
 - C) Specific DNA sequences
 - D) Cell surface receptors
 - E) Zinc fingers

3. The PCR reaction mixture does *not* include:
 - A) DNA containing the sequence to be amplified.
 - B) all four deoxynucleoside triphosphates.
 - C) heat-stable DNA polymerase.
 - D) oligonucleotide primer(s).
 - E) DNA ligase.

4. When bacterial DNA replication introduces a mismatch in a double-stranded DNA, the methyl-directed repair system:
 - A) cannot distinguish the template strand from the newly replicated strand.
 - B) changes both the template strand and the newly replicated strand.
 - C) corrects the mismatch by changing the newly replicated strand.
 - D) corrects the mismatch by changing the template strand.
 - E) corrects the DNA strand that is methylated.

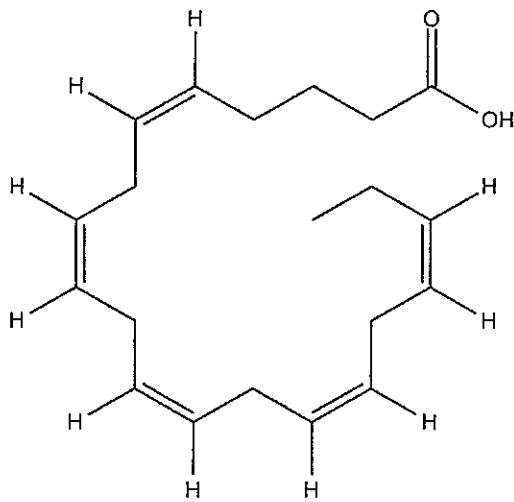
5. Eukaryotes solve the problem of replicating the ends of their linear chromosomes by:
 - A) terminal redundancy whereby each end of the chromosome is duplicated allowing recombination.
 - B) enzyme activity that uses an RNA template and reverse transcription in a series of repeat cycles.
 - C) by covalently linking the two strands at each end of the linear chromosome to form a circle.
 - D) using a protein as a primer.
 - E) all of the above.

6. What chemical force does atomic force microscopy operate upon?
 - A) Hydrogen bond
 - B) Ionic force
 - C) Covalent bond
 - D) van der Waals
 - E) magnetic force

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7. GPI stands for glycosylphosphatidylinositol that anchors a protein to a membrane. Which of the following is correct?
- A) A GPI anchor is added when a protein is in the cytoplasm.
 - B) A GPI anchor is added when a protein is in the ER.
 - C) A GPI anchor is added when a protein is in the endosome.
 - D) A GPI anchor is added when a protein is in the Golgi apparatus.
 - E) A GPI anchor is added when a protein is in the plasma membrane.
8. What is the oxidation status of the carbon in methane?
- A) -5
 - B) -4
 - C) -3
 - D) -2
 - E) -1
9. Which of the following reaction is it that is mediated by pyridoxal phosphate (Vitamin B6)?
- A) Phosphorylation
 - B) Isomerization
 - C) Racemization
 - D) Glycosylation
 - E) Lipidation
10. Which of the following membrane lipid is it that serves as a eat-me signal in an apoptotic cell?
- A) Phosphatidylinositol
 - B) Phosphatidylethanolamine
 - C) Phosphatidylserine
 - D) Phosphatidylcholine
 - E) Sphingosine-1-phosphate
11. Which of the following statements is correct regarding the biosynthesis of purine nucleotides?
- A) Glycine, aspartate, and glutamine serve as nitrogen sources for the purine ring.
 - B) The concentration of 5-phosphoribosyl 1-pyrophosphate is the major factor regulating the rate of de novo purine nucleotide biosynthesis.
 - C) Lesch-Nyhan syndrome is caused by a defect in hypoxanthine-guanine phosphoribosyl transferase, an enzyme involved in purine salvage.
 - D) AMP and GMP inhibit hypoxanthine-guanine phosphoribosyl transferase, which converts hypoxanthine and guanine into IMP and GMP.
 - E) All of the above are correct.

12. Which of the following is the correct nomenclature name for the unsaturated fatty acid shown below?



- A) ω 6, C20:5
 - B) ω 3, C20:5
 - C) ω 6, C20:6
 - D) ω 3, C20:6
 - E) ω 5, C20:5
13. Prostanoids are synthesized by
- A) Pentose phosphate pathway
 - B) β -oxidation pathway
 - C) Lipoxygenase pathway
 - D) Cyclooxygenase pathway
 - E) All of the above are wrong
14. Which of the following compounds is not a ketone body?
- A) Glycolic acid
 - B) Acetoacetate
 - C) D-3-Hydroxybutyrate
 - D) Acetone
 - E) All of the above are correct.
15. When fatty acids with an odd number of carbon atoms are oxidized via the β -oxidation pathway, which compound will propionyl-CoA be converted into?
- A) Acetyl-CoA
 - B) Acetoacetyl-CoA
 - C) Succinyl-CoA
 - D) Malonyl-CoA
 - E) All of the above are wrong

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16. During intense physical activity, NADH generated in glycolysis is rapidly reoxidized by which reaction?
- A) Reduction of pyruvate to lactate by lactate dehydrogenase.
 - B) Conversion of glucose-6-phosphate to fructose-6-phosphate.
 - C) Oxidation of dihydroxyacetone phosphate to glycerol-3-phosphate.
 - D) Reduction of oxaloacetate to malate.
 - E) Formation of citrate from oxaloacetate and acetyl-CoA.
17. Arsenic poisoning inhibits which enzyme of the citric acid cycle, thereby impairing oxidative metabolism?
- A) Citrate synthase.
 - B) Malate dehydrogenase.
 - C) α -Ketoglutarate dehydrogenase.
 - D) Fumarase.
 - E) Aconitase.
18. Which glycolytic product serves as the primary precursor for entry into the citric acid cycle?
- A) 2-Phosphoglycerate.
 - B) Glyceraldehyde-3-phosphate.
 - C) Pyruvate.
 - D) Glucose-6-phosphate.
 - E) Fructose-1,6-bisphosphate.
19. Which polysaccharide is found in the plant cell wall and provides structural support?
- A) Glycogen
 - B) Amylopectin
 - C) Cellulose
 - D) Starch
 - E) Chitin
20. Which of the following glycolytic intermediates is directly involved in the generation of ATP through substrate-level phosphorylation?
- A) Glucose-6-phosphate.
 - B) Phosphoenolpyruvate.
 - C) Fructose-1,6-bisphosphate.
 - D) Glyceraldehyde-3-phosphate.
 - E) 3-phosphoglycerate.
21. What is the major driving force for the formation of tertiary structures in cytoplasmic proteins?
- A) Formation of peptide bonds.
 - B) Hydrogen bonding between backbone atoms.
 - C) Hydrophobic interactions among nonpolar side chains.
 - D) Covalent bonding between side chains of amino acids.
 - E) Ionic interactions between side chains of amino acids.

22. What is the most obvious structural feature that differentiates parallel β -sheets from antiparallel β -sheets?
- A) The total number of the hydrogen bonds.
 - B) The direction of the peptide chains relative to each other.
 - C) The amino acid composition of the strands.
 - D) The presence of disulfide bonds.
 - E) The length of strands in the sheet.
23. In a cytoplasmic and globular protein, where would you most likely find hydrophobic amino acids?
- A) On the surface of the protein.
 - B) In the interior of the protein.
 - C) Randomly distributed throughout the protein.
 - D) In the α -helices of a protein.
 - E) Around metal ions, such as Zn^{2+} or Fe^{2+} .
24. What effect does a competitive inhibitor have on enzyme kinetics?
- A) Decreases V_{max} and does not change K_m .
 - B) Increases K_m and does not change V_{max} .
 - C) Decreases both V_{max} and K_m .
 - D) Does not affect either V_{max} or K_m .
 - E) Increases V_{max} and decreases K_m .
25. In Michaelis-Menten kinetics, what assumption is made about the enzyme-substrate complex during the steady-state phase of the reaction?
- A) The concentration of the enzyme-substrate complex is constant.
 - B) The enzyme is saturated with substrate.
 - C) Product concentration remains constant.
 - D) The product is formed as soon as the substrate binds to the enzyme.
 - E) The enzyme binds to substrate irreversibly.
26. Which following statement is correct in human cells?
- A) Catabolism is usually an endergonic reaction in human cells.
 - B) Most metabolisms follow the thermodynamic laws, but few do not follow the first law of thermodynamics because human beings need to eat every day.
 - C) Anabolism often comes along with ATP generation in human cells.
 - D) The Complex III in the oxidative phosphorylation is not a proton pump.
 - E) Cytochrome C is a proton carrier that delivers the proton to Complex IV in oxidative phosphorylation.
27. What is the amino acid residue in glycogenin able to form a covalent bond with a glucose residue in the glycogen complexes?
- A) serine
 - B) asparagine
 - C) tyrosine
 - D) glutamine
 - E) threonine.

28. Which following enzyme can generate 5'-AMP?
- A) phosphodiesterase
 - B) adenylyl kinase
 - C) phosphorylase
 - D) protein phosphatase-1
 - E) heme oxygenase.
29. Which following one is an essential amino acid for human cells?
- A) proline
 - B) cysteine
 - C) serine
 - D) glycine
 - E) phenylalanine.
30. What type of cells is responsible for heme catabolism in the human liver?
- A) Kupffer cells
 - B) Reticuloendothelial cells
 - C) Stellate macrophages
 - D) Hepatic stellate cells
 - E) Hepatocytes.
31. Which term below describes the RNA synthesis process using the DNA template?
- A) Translation
 - B) Transcription
 - C) Replication
 - D) Splicing
 - E) Elongation
32. Which subunit described below is not a component of E. coli RNA polymerase?
- A) α
 - B) β
 - C) ω
 - D) σ
 - E) ϵ
33. Which below class of RNA encodes protein?
- A) mRNA
 - B) rRNA
 - C) tRNA
 - D) snRNA
 - E) siRNA

34. Which RNA processing can protect RNA from a 3' → 5' exonuclease attack?
- A) Splicing
 - B) 5' capping
 - C) 3' polyadenylation
 - D) Termination
 - E) Phosphorylation
35. Which below rRNA is not from RNA processing of pre-rRNA transcript (45S rRNA)?
- A) 5.8S rRNA
 - B) 5s rRNA
 - C) 18S rRNA
 - D) 28S rRNA
 - E) None of the above all
36. Which one of the following hormones acts through ion channel linked receptor mechanism?
- A) Cortisol
 - B) Progesterone
 - C) Thyroxine
 - D) Acetylcholine
 - E) Epinephrine
37. Which one of the following is NOT a general feature of hydrophilic hormones?
- A) They are proteins and polypeptides.
 - B) They do not need a transport protein.
 - C) They bind to intracellular receptor.
 - D) Their plasma half-life is short in minutes.
 - E) They act through second messenger.
38. To which level of protein structure does hemoglobin belong due to its multiple polypeptide chains?
- A) Primary structure
 - B) Secondary structure
 - C) Tertiary structure
 - D) Quaternary structure
 - E) None of the above
39. In the phosphatidylinositol pathway, which molecule acts as a second messenger to release calcium from the endoplasmic reticulum?
- A) DAG (Diacylglycerol)
 - B) cAMP (Cyclic AMP)
 - C) IP3 (Inositol trisphosphate)
 - D) cGMP (Cyclic GMP)
 - E) None of the above

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40. Thyroid hormones (T3 and T4) are synthesized from which amino acid?
- A) Tyrosine
 - B) Tryptophan
 - C) Serine
 - D) Methionine
 - E) Phenylalanine
41. Which wavelength is used to measure protein concentration using spectrophotometry?
- A) 230 nm
 - B) 240 nm
 - C) 260 nm
 - D) 280 nm
 - E) 300 nm
42. What is the post-translational modification that marks proteins for degradation by the 26S proteasome?
- A) Phosphorylation
 - B) SUMOylation
 - C) Ubiquitination
 - D) Glycosylation
 - E) Acetylation
43. Which lipoprotein is degraded from very-low-density lipoprotein (VLDL) and serves as the major carrier of cholesterol in the bloodstream?
- A) Chylomicrons
 - B) High-density lipoprotein 2 (HDL2)
 - C) High-density lipoprotein 3 (HDL3)
 - D) Intermediate-density lipoprotein (IDL)
 - E) Low-density lipoprotein (LDL)
44. Which of the following is a nucleotide, composed of a nitrogenous base, a pentose sugar, and a phosphate group?
- A) Adenylate
 - B) Guanosine
 - C) Thymine
 - D) Deoxycytidine
 - E) Uridine
45. Which enzyme catalyzes the rate-limiting step in cholesterol synthesis?
- A) HMG-CoA synthase
 - B) HMG-CoA reductase
 - C) Squalene synthase
 - D) Mevalonate kinase
 - E) Acetyl-CoA carboxylase

46. Which posttranslational modification is involved in proteasome-mediated protein degradation:
- A) Myristoylation
 - B) Palmitoylation
 - C) Isoprenylation
 - D) SUMOylation
 - E) Ubiquitylation
47. In eukaryotic translation initiation, which component is required for recognizing the 5' poly-A tail of mRNA:
- A) eIF1A
 - B) eIF2B
 - C) eIF3
 - D) eIF4G
 - E) eIF5
48. A cDNA library contains sequences of:
- A) A collection of genomic DNA fragments
 - B) A collection of microRNAs
 - C) A collection of mRNAs
 - D) A collection of mitochondrial DNA
 - E) All of above
49. Acetylation and methylation commonly occur on which amino acid residue in histones, influencing chromatin structure?
- A) Serine
 - B) Lysine
 - C) Threonine
 - D) Tyrosine
 - E) Histidine
50. Glycosylation, the addition of sugar moieties, can occur on which amino acid residues?
- A) Lysine and Arginine
 - B) Asparagine, Serine, and Threonine
 - C) Glutamate and Aspartate
 - D) Valine and Isoleucine
 - E) Methionine and Cysteine

試題隨卷繳回