國立中央大學 107 學年度碩士班考試入學試題

所別： 企業管理學系 碩士班 一般乙組(一般生) 共3頁 第1頁

科目： 生物化學(含分子生物學)

本科考試禁用計算器 *請在答案卷(卡)內作答

Part I. Multiple choice questions (total 75%): each of questions or incomplete statements below is followed by five suggested answers or completions. Select the one that is best in each case.

1. Which of the following amino acids is exclusively ketogenic?
   (a) Arginine (b) Leucine (c) Isoleucine (d) Phenylalanine (e) Tyrosine

2. Which of the following amino acids is derived from a glycolytic intermediate?
   (a) Arginine (b) Aspartate (c) Serine (d) Threonine (e) Proline

3. An *N*-linked glycan would be attached to _____
   (a) Asn (b) Lys (c) Gln (d) Arg (e) Ser

4. Formation of bilirubin occurs in _____
   (a) Spleen (b) Adipose tissue (c) Heart (d) Blood (e) Liver

5. If the ΔG value for a given biochemical reaction is a relatively large, positive value, which of the following is **TRUE**?
   (a) The reaction is at equilibrium
   (b) The reaction is thermodynamically favorable
   (c) The reaction is freely reversible
   (d) The reverse reaction is thermodynamically favorable
   (e) The reaction is said to be exergonic

6. Which of the following enzyme catalyzes the committed step in the citric acid cycle?
   (a) Succinate dehydrogenase
   (b) Citrate synthase
   (c) Pyruvate dehydrogenase
   (d) Isocitrate dehydrogenase
   (e) Succinyl-CoA synthetase

7. DNA synthesis is inhibited by 5-fluoro-dUMP which acts on _____
   (a) Phosphoribosyltransferase
   (b) Thymidylate synthase
   (c) Pyruvate kinase
   (d) Reductase
   (e) Acyl-CoA dehydrogenase

8. The enzyme that aspirin acts on_____
   (a) Tyrosinase
   (b) Tryptophan oxygenase
   (c) Cyclooxygenase
   (d) Hypoxanthine-guanine phosphoribosyltransferase
   (e) Glutamate dehydrogenase

9. The individuals who are deficient in which of following enzymes are the one most sensitive to antimalarial drugs primaquine?
   (a) Glucose-6-phosphate dehydrogenase
   (b) Glutamate dehydrogenase
   (c) Malate dehydrogenase.
   (d) Glyceraldehyde-3-phosphate dehydrogenase
   (e) 6-phosphogluconate dehydrogenase

10. Which of the following statements is **NOT TRUE**?
   (a) Glucagon is secreted in response to low blood glucose levels
   (b) Epinephrine activates phosphorylase kinase in glucose metabolism
   (c) Insulin has effects opposite to those of epinephrine and glucagon
   (d) Insulin increase the capacity of the liver to synthesize glycogen
   (e) Glucagon increases triacylglycerol synthesis

參考用

注意:背面有試題

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所別： 企業管理學系 碩士班 一般乙組(一般生)　　共3頁 第2頁

科目： 生物化學(含分子生物學)

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11. Which of the following statements is **NOT TRUE** for mitochondria?
(a) The final electron acceptor is $NADP^+$
(b) One source of electrons is NADH
(c) Requires a system of intact membranes to generate ATP
(d) Contains cytochromes and flavins in its electron transfer chain
(e) Electron transfer leads to establishment of a proton gradient

12. Which of the following statements about the pentose phosphate pathway is **NOT TRUE**?
(a) It interconverts troses, tetroses, pentoses, hexoses, and heptoses
(b) It generate NADH for reductive biosyntheses
(c) It is more active in fat-storage cells than in muscle cells
(d) The reactions occur in the cytosol
(e) Through this pathway, excess ribose 5-phosphate can be completely converted into glycolytic intermediates

13. Which of the following would be considered an ω-3 fatty acid?
(a) Linoleic acid: 9,12-octadecadieneoic acid (18:2*c*Δ9,12)
(b) γ-linolenic acid: 6,9,12-octadecatrieneoic acid (18:3*c*Δ6,9,12)
(c) Eicosapentaenoic acid: 5,8,11,14,17-eicosapentaenoic acid (20:5*c*Δ5,8,11,14,17)
(d) Arachidonic acid: 5,8,11,14-eicosatetraenoic acid (20:4*c*Δ5,8,11,14)
(e) All of the above

14. Where are G-quadruplexes most commonly found?
(a) Centromere
(b) Telomere
(c) The end of hairpin loops
(d) Replication origin
(e) Transcription termination sites

15. Which of the following is **NOT** a physiological role of nucleotides?
(a) Components of many proteins
(b) Components of the coenzymes NAD, FAD, and CoA
(c) Intracellular signaling molecules
(d) Intermediates for biosynthetic processes
(e) Allosteric regulators

16. Which of the following description about the organization of DNA in the nucleus is **NOT TRUE**?
(a) DNA helix → nucleosome → 30 nm chromatin fiber → condensed fiber
(b) The core of nucleosome containing H2A, H2B, H3, and H4 proteins
(c) H4 tail helps to form 30 nm chromatin fiber
(d) Euchromatin structure is highly condensed regions of interphase chromosomes
(e) Highly expressed genes are often arranged in the loop domain of chromosomes

17. Which of the following description about prokaryotic DNA replication is **NOT TRUE**?
(a) Dna G synthesizes 11 nucleotides of RNA as a primer
(b) The α subunit of DNA polymerase III is responsible to form phosphodiester bond
(c) Dna B binds to DNA and unwind DNA, so it has a helicase activity
(d) The β clamp is essential for the processivity of DNA polymerase III
(e) Single-strand binding protein (SSB) contains enzyme activity to melt DNA

18. Which of the following description about splicing is **NOT TRUE**?
(a) RNA splicing needs spliceosomes which contain snRNA and proteins
(b) U2 snRNA mismatches the branch point A to allow the A attacking a G residue at the 5' site of the intron
(c) The 5' splice site is first recognized by U1 snRNA, then by U2 snRNA to increase the accuracy of 5' site selection
(d) U6 snRNA brings 5' site close to the branch point
(e) U5 snRNA brings 5' exon and 3' exon close for phosphoryl transfer reaction

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19. Which of the following enzymes are required for nick translation of DNA replication?
(a) DNA ligase, DNA polymerase III, DNA polymerase I
(b) Primase, DNA polymerase I
(c) DNA polymerase III, DNA ligase
(d) DNA polymerase I, DNA ligase
(e) Helicase, DNA polymerase I

20. Which of the following description about eukaryotic translation is **NOT TRUE**?
(a) eIF2-GTP brings Met-tRNA to P site of the ribosome
(b) eIF2 cycle is the control of eukaryotic translation
(c) 18S rRNA of small ribosome binds to Shine-Dalgarno (SD) sequence of mRNA to initiate transcription
(d) Peptide bond formation is catalyzed by the peptidyltransferase which locates in 28S rRNA
(e) eEF-2 is responsible for the translocation because it mimic the structure of eEF-1α with aminoacyl-tRNA

21. Which of the following descriptions about Eukaryotic mRNA is **NOT TRUE**?
(a) Eukaryotic mRNA has the 5' capping
(b) Eukaryotic mRNA has poly-A tail
(c) Eukaryotic mRNA is polycistronic
(d) Eukaryotic mRNA does not have Shine-Dalgarno (SD) sequence
(e) Eukaryotic mRNA is synthesized in the nucleus

Questions 22-25 refer to the following descriptions, list the characteristics that correctly describe that DNA repair process.

(a) RecA protein participates
(b) Damaged nucleotides are removed by nick translation
(c) The repair system requires coenzyme $FADH^-$
(d) Deficiency of this enzyme in humans greatly increases the risk of skin cancer
(e) This process begins up to a kbp away from the site to be repaired

22. photoreactivation repair _____

23. Base excision repair_____

24. Recombinational repair_____

25. Mismatch repair _____

Part II Short Answer and Essay Questions (total 25%):

1. What is the effect (decrease, increase or no effect) of increased concentration of ATP on the rate of glycolysis and which enzymes are involved in such regulatory effect? (6%)

2. High levels of cholesterol in the blood is positively correlated with the incidence of atherosclerosis. The ratio of LDL: HDL is a better indicator of coronary artery obstruction, Why? (6%)

3. Why does liver damage cause jaundice? (5%)

4. Eukaryotic RNA polymerase II required transcription factors for transcription. Which transcription factor can recognize a common promoter (TATA box)? Which transcription factor is responsible for phosphorylation on C-terminal domain of RNA polymerase II and what is the physiological meaning for such phosphorylation? (8%)