第 1 至 10 題為選擇題(20%)

1. Maintaining restriction endonuclease resistance after DNA replication is by
a) methylation b) phosphorylation c) acetylation d) ethylation

2. The helix-turn-helix motif is a
a) DNA-binding element. b) RNA-binding element.
c) CAP-binding element. d) NTD-binding element.

3. Which on of the RNA fragments can form a hairpin?
a) UGCGCAGUCUGUG b) UACGAAGUUCGUA
c) CACGGAGCUCCUG d) CACAAGGUCCGGA

4. The ribosomal genes are different from other nuclear genes because of
a) low GC contents. b) low repetitive sequences.
c) found only in nucleolus. d) found only in nuleoplasm.

5. The role of RNA polymerase II is for synthesis of
a) rRNA b) mRNA c) tRNA d) 5S RNA

6. Proteins are made in
a) the NH_2- to COOH-direction. b) the COOH- to NH_2-direction.
c) either direction d) no direction

7. Suppressor tRNAs have altered anticodons that can prevent termination by inserting an amino acid and allowing the ribosome to move on to the next codon because they can recognize
a) stop codon b) initiation codon c) Met codon d) AUG codons

8. The tRNAs have 4 base-paired stems. To which loop or stem amino acids are charged?
a) the D loop b) anticodon loop c) T loop d) the acceptor stem.

9. Proteins are made in
a) the NH_2- to COOH-direction. b) the COOH- to NH_2-direction.
c) either direction d) no direction

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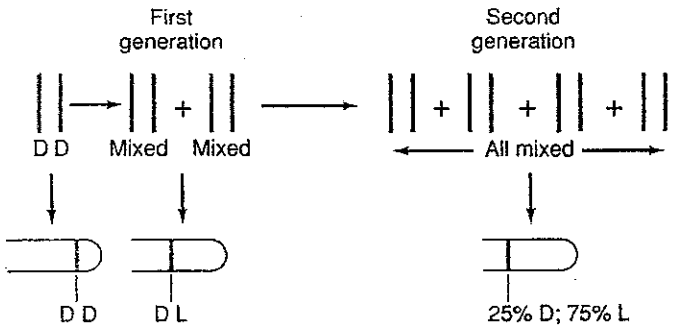
10. The following scheme represents which model of DNA replication?
a) conservative b) semi-conservative c) non-conservative
d) random dispersive



The bottom potion depicts the centrifugation results.

11. (6%) Polysaccharides (e.g., starch, glycogen, glycosaminoglycans... etc.) serve _____and_____functions.

12. (6%) The major alterations of carbohydrate metabolism in IDDM (insulin-dependent diabetes mellitus) patient are as following: Decreased glucose uptake by certain tissues; but increased _____ and _____ two pathways.

13. (3%) Individuals with a _____ deficiency (Type I Glycogen storage disease, von Gierke's disease) often develop a lactic acidosis during fasting.

14. (5%) Please briefly describe the regulation of glycogen metabolism in liver.

15. (7%) Consider a preparation that contains all the enzymes and cofactors necessary for fatty acid biosynthesis from added acetyl-CoA and malonyl-CoA. If [2-^{14}C]acetyl-CoA (labeled with ^{14}C on the second carbon) and an excess of unlabeled malonyl-CoA are added as substrates, how many ^{14}C atoms are incorporated into every molecular of palmitate? What are their locations? Explain.

16. (7%) What would you expect the profile of plasma lipoprotein (a) in mice deficient in apoE? (b) In mice deficient in apoC-II? Please explain.

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17. (6%) When adult rats were fed with diet containing no C18:2$\triangle^{9,12}$ and C18:3$\triangle^{9,12,15}$ fatty acids, after one month a significant amount of C20:3$\triangle^{5,8,11}$ fatty acid was found in the plasma of these rats. Why? Please explain. (The C20:3$\triangle^{5,8,11}$ fatty acid is not found in the plasma of normal rats.)

18. (11 %) Please draw chemical structures of any one of purine nucleosides and its corresponding nucleotide (6%). Briefly describe the amphibolic intermediates during the *de nove* synthesis of purine (5%).

19. (9 %, 3% each) Briefly described the following terms:
    (a) mRNA splicing
    (b) DNA polymerase I
    (c) site-specific recombination in eukaryotes

20. (10%) Pleasae define the biochemical processes: glycolysis and gluconeogenesis.

21. (10%) How cell converts amino acid carbon skeleton in glucose molecule (Please give the key enzyme and co-factors in this conversion).