Indian Institute of Technology Kharagpur
Class Test Mid semester

A

Sub: Science of Living Systems Sub **No: BS20001** **Full Marks: 20**
Session: Autumn, 2016-2017 **Date: 31-08-2016** **Time: 40 minutes**

NAME: **ROLL NO:** **DEPT**

Choose (tick) the (ONE) correct answer OR write in a few words

1. The byproduct of forming a peptide bond from two amino acids is
(A) **H_2O** (B) NH_3 (C) CO_2 (D) O_2

2. Write the name of a hydrophobic and a charged amino acid.
Hydrophobic: _____ Charged: _____

Hydrophobic: Glycine; Alanine; Valine; Leucine; Isoleucine; Proline; Phenylalanine; Methionine; Tryptophan

Charged: Aspartic acid; Glutamic acid; Arginine; Lysine; Histidine

3. State **TRUE** or **FALSE**
(A) Proteins fold with their hydrophobic amino acids on the surface and hydrophilic amino acids in the core **F**
(B) Central dogma of molecular biology states that RNA is translated from proteins **F**
(C) Proteins are only comprised of one protein domain **F**
(D) Glycine is the only natural amino acid without a stereoisomer **T**

4. Which step of RNA processing occurs in eukaryotes but not in prokaryotes? _____

5' capping; polyA tail; mRNA splicing

5. Transcription is initiated by the binding of RNA polymerase in the ___**promoter**___ site and translation always get started from _**Start/AUG**_ codon.

6. Lac operon is induced under which condition?
(A) Presence of lactose (B) Presence of glucose and absence of lactose
(C) Presence of glucose (D) **Presence of lactose and absence of glucose**

7. Metal ions such as Mg^{2+}, Na^{+} typically interact with the __**phosphate**__ group of DNA.

8. During translation, peptidyl transferase center (located on ribosome) catalyzes
(A) **Peptide bond formation** (B) Amino acid activation
(C) Transfer of phosphate group (D) Binding of ribosomal subunits to mRNA

9. Imagine a segment of DNA (within a gene) encoding a certain amount of information in its nucleotide sequence. When this segment is fully transcribed into mRNA and then translated into protein, in general
(A) the protein sequence would carry more information compared to the DNA and mRNA sequences, because its alphabet has 20 letters.

(B) the protein sequence would carry less information compared to the DNA and mRNA sequences, because several codons can correspond to one amino acid.

(C) the amount of information in the mRNA sequence is lower, because the mRNA has been transcribed using only one of the DNA strands as the template.

(D) the amount of information in the mRNA sequence is higher, because several mRNA molecules can be transcribed from one DNA molecule.

10. Indicate if each of the following descriptions matches RNA (R) or DNA (D).

(**D**) It is mainly found as a long, double-stranded molecule.

(**R**) It contains the sugar ribose.

(**D**) It normally contains the bases thymine, cytosine, adenine, and guanine.

(**R**) It can be used as the template for protein synthesis.

11. A tripeptide has

(A) 3 amino acids and 3 peptide bonds (B) 4 amino acids and 3 peptide bonds

(C) **3 amino acids and 2 peptide bonds** (D) 6 amino acids and 3 peptide bonds

12. What is plotted in Ramachandran plot?

(A) **psi vs phi** (B) psi vs omega (C) omega vs phi (D) phi vs chi

13. For the macro dipole along an α-helix, the positive end is towards **N** terminus of the helix.

14. Protein secondary structures are stabilized primarily by

(A) **Hydrogen bonds** (B) van der Waal's forces

(C) electrostatic interactions (D) Amino acid sidechains

15. You have purified a multisubunit extracellular protein that has several interchain disulfide bonds. Which of the following chemicals would you add to your purified protein mixture if you wanted to eliminate the disulfide bonds?

(A) NaCl, a salt (B) SDS, an ionic detergent

(C) H_2O_2, an oxidizing reagent (D) **DTT, a reducing agent**

16. Your friend is repeating Anfinsen's experiment with an enzyme that has six cysteine residues and forms three disulfide bonds. What is the total number of double bonds possible when they are formed randomly in the denatured protein?

(A) 105 (B) **15** (C) 720 (D) 3

17. Which of the following can have catalytic activity

(A) DNA (B) **RNA**

(C) Lipids (D) Polysaccharide

18. Methanol poisoning is treated with ethanol which actually slows down the formation of formaldehyde. This is an example of

(A) **Competitive inhibition** (B) Uncompetitive inhibition

(C) Allosteric regulation (D) None of the above

19. State TRUE and FALSE from the following statements

(A) Enzymes catalyze a reaction by lowering the transition-state free energy **T**

(B) Transition state stabilization occurs only in the Lock and Key model **F**

20. State TRUE and FLASE from the following statements

(A)	Leading strand are synthesized from 5’ to 3’ direction	**T**
(B)	Lagging strand are synthesized from 3’ to 5’ direction	**F**
(C)	Transcription and translation are coupled process in bacteria	**T**
(D)	5’ end of nascent eukaryotic mRNA acquires a poly A tail	**F**

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