

BIRLA INSTITUTE OF TECHNOLOGY AND SCIENCE, PILANI - HYDERABAD CAMPUS
FIRST Semester, 2022-2023
COMPREHENSIVE EXAM - PART A

Course Name: **BIOLOGICAL CHEMISTRY**

Course Number: **BIO F211**

Max. Marks: (20 x 0.5 = 10M)

Duration: 30 minutes

Date: December 17 2022

Name:

ID No:

Provide Most appropriate answer. Ensure both sides of the page are printed. Encircle the most appropriate choice. Avoid over-writing. Make sure you write your Name and ID without fail. PENCIL SHOULD NOT BE USED. NO negative marking. Questions 1-20 printed on both sides of the page. NO Negative marking.

- (1). _____ amino acid has no optical rotation
(A) Proline (B) Serine (C) Glycine (D) Leucine
- (2). _____ should elute second in size-exclusion (gel filtration) chromatography
(A) Cytochrome c $M_r = 13,000$ (B) Immunoglobulin G $M_r = 145,000$
(C) RNA polymerase $M_r = 450,000$ (D) Albumin $M_r = 68,500$
- (3). _____ chromatographic technique would be best to separate a protein that binds strongly to its substrate
(A) Gel filtration (B) Cation exchange (C) Anion exchange (D) Affinity
- (4). _____ disrupts di-sulphide bond in protein tertiary structure
(A) pH (B) β -mercaptoethanol (C) Urea (D) None
- (5). An enzyme catalyzes a reaction at a velocity of 20 $\mu\text{mol}/\text{min}$ when the concentration of substrate (S) is 0.01 M. The K_m for this substrate is 1×10^{-5} M. Assuming that Michaelis-Menten kinetics are followed, the reaction velocity will be _____ when the concentration of [S] is 1×10^{-5} M
(A) 1.0 $\mu\text{mol min}^{-1}$ (B) 0.1 $\mu\text{mol min}^{-1}$ (C) 100 $\mu\text{mol min}^{-1}$ (D) 10 $\mu\text{mol min}^{-1}$
- (6). For the enzymatic pathway $A \rightarrow B \rightarrow C \rightarrow D$, the $\Delta G^{0'}$ for $A \rightarrow B$ is -7 ; for $B \rightarrow C$ is $+4$; for $C \rightarrow D$ is $+1$. Then the $\Delta G^{0'}$ for $A \rightarrow D$ will be:
(A) +5 (B) +2 (C) -2 (D) -1
- (7). Maximum ATP molecules are produced from _____
(A) Glycolysis (B) Oxidation of pyruvate (C) Krebs cycle (D) Chemiosmosis
- (8). The amino acid highly disfavored in the middle of the α -helix structure is _____
(A) Alanine (B) Leucine (C) Aspartic acid (D) Proline
- (9). Na^+ and K^+ ions are transported across the membrane by _____ and _____ .
(A) Active transport and not requiring ATP (B) Active transport and requiring ATP
(C) Passive transport and requiring ATP (D) Passive transport and not requiring ATP
- (10). The "buried core" of globular proteins, in general, is composed of non-polar amino acids because of
(A) Hydrogen bonds (B) A very high and favorable electrostatic interactions
(C) van der Waals interactions (D) Hydrophobic effect

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- (11). _____ experimental technique(s) can be used to determine the three dimensional structure of a protein
 (A) NMR (B) X-ray crystallography (C) only B (D) Both A & B
- (12). _____ pair are an example of anomeric isomers
 (A) Glucose and Galatose (B) Galactose and mannose (C) α -D Glucose and β -D Glucose
 (D) D-Glucose and L-Glucose
- (13). Aldoheptose (7 carbon sugar) can have _____ number of optical isomers
 (A) 7 (B) 32 (C) 35 (D) 28
- (14). Inhibiting the activity of an enzyme by blocking its active site is _____
 (A) Competitive inhibition (B) Allosteric inhibition (C) Non-competitive inhibition
 (D) Feedback inhibition
- (15). _____ is the common role of an allosteric inhibitor
 (A) Causes the enzyme to enhance enzyme reaction rate (B) Binds to the active site of the enzyme
 (C) Leads to feedback inhibition (D) None
- (16). When compared to the enzyme substrate, the competitive inhibitor on a Lineweaver-Burke double reciprocal plot
 (A) Changes the X axis-intercept (B) Changes the Y axis-intercept (C) Changes both X and Y axis intercept
 (D) Incomplete information to arrive at an answer
- (17). On a Lineweaver-Burk double reciprocal plot
 (A) X-axis is V and Y-axis is [S] (B) X-axis is V and Y-axis is 1/[S] (C) X-axis is 1/V and Y-axis is 1/[S]
 (D) X-axis is [S] and Y-axis is 1/V
- (18). In phosphodiester linkages in nucleic acids
 (A) 5'-phosphate group of one nucleotide unit is bonded to the 3'-hydroxyl group of the next nucleotide
 (B) 3'-phosphate group of one nucleotide unit is bonded to the 5'-hydroxyl group of the next nucleotide
 (C) 5'-phosphate group of one nucleotide unit is bonded to the 5'-hydroxyl group of the next nucleotide
 (D) 3'-phosphate group of one nucleotide unit is bonded to the 3'-hydroxyl group of the next nucleotide
- (19). Triglycerides are
 (A) Hydrophilic (B) Major constituents of membranes (C) Non-polar (D) All of the above
- (20). The isoelectric pH (pI) of glutamic acid will be _____ (the pK_a values for glutamic acid are 2.2 for α -COOH); 9.60 for α -NH³⁺ and 4.2 for the side chain.
 (A) 3.2 (B) 6.4 (C) 5.0 (D) 6.9