

## I : BIOCHEMISTRY

## Q.1 – Q.10 carry one mark each.

- Q.1. Nucleolus is involved in the synthesis of  
(A) rRNA (B) tRNA (C) DNA (D) mRNA
- Q.2. In tryptophan operon, tryptophan acts as  
(A) Repressor (B) Activator (C) Co-repressor (D) Co-activator
- Q.3. Positive selection of T cells ensures  
(A) MHC restriction (B) Self tolerance  
(C) TCR engagements (D) Activation by co-stimulatory signal
- Q.4. A DNA-binding motif is  
(A) Helix-loop-helix (B) Helix-turn-helix (C) Helical wheel (D) Loop-helix-loop
- Q.5. Amino acids responsible for N-linked and O-linked glycosylation of proteins are  
(A) Asparagine and Aspartic acid (B) Glutamine and Serine  
(C) Glutamic acid and Serine (D) Asparagine and Threonine
- Q.6. One of the following compounds is NOT a neurotransmitter  
(A) Dopamine (B) Glutamic acid (C) Histidine (D) Glycine
- Q.7. Approximate molecular weight (kDa) of the product after translation of a 390 bases mRNA will be  
(A) 48 (B) 26 (C) 39 (D) 14
- Q.8. Lineweaver-Burk plot is a plot of  
(A)  $\frac{1}{v_0}$  vs  $\frac{1}{[S]}$  (B)  $v_0$  vs  $[S]$  (C)  $v_0$  vs  $\frac{1}{[S]}$  (D)  $\frac{1}{v_0}$  vs  $[S]$
- Q.9. A mixture of proteins (W, X, Y, Z) elute from Sephadex G-200 column in the order W, X, Y, Z. The protein with maximum electrophoretic mobility on SDS-PAGE will be  
(A) W (B) X (C) Y (D) Z
- Q.10. Specific precursor for all prostaglandins is  
(A) Oleic acid (B) Arachidonic acid (C) Palmitic acid (D)  $\alpha$ -Linolenic acid

## Q.11 – Q.20 carry two marks each.

- Q.11. Chymotrypsin and lysozyme are involved respectively in

P. Removal of successive carboxyl terminal residues

Q. Hydrolytic cleavage of peptide bond

R. Cleavage of glycosidic C-O bond

S. Oxygen transport in blood

- (A) P, Q (B) Q, R (C) Q, S (D) R, S

Q.12. Match the items in **Group 1** with those in **Group 2**

**Group 1**

- P. Isotype switching
- Q. Clonal energy
- R. Class II MHC
- S. Self tolerance

- (A) P-1, Q-4, R-3, S-2
- (C) P-1, Q-3, R-4, S-2

**Group 2**

- 1. V<sub>H</sub> domain
- 2. Non-responsive to self antigen
- 3. Non-responsive T<sub>H</sub> cells
- 4. β<sub>2</sub>-microglobulin

- (B) P-2, Q-4, R-1, S-3
- (D) P-2, Q-1, R-3, S-4

Q.13. Multiple RNA polymerase transcribes a DNA template, unwinding about 1.5 turns of DNA template per transcription bubble. From the structural information of classical B-DNA, how many transcription bubbles are possible for a 180 base pair DNA molecule?

- (A) 12
- (B) 27
- (C) 6
- (D) 270

Q.14. Match the items in **Group 1** with the most appropriate separation techniques in **Group 2**

**Group 1**

- P. Mixture of glycine and albumin
- Q. Mixture of 20 and 60 kDa proteins
- R. Histones from nuclear extract
- S. Lectins

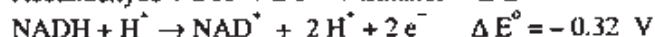
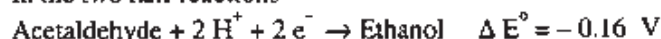
- (A) P-1, Q-4, R-3, S-5
- (C) P-2, Q-4, R-6, S-3

**Group 2**

- 1. Gas chromatography
- 2. Dialysis
- 3. Affinity chromatography
- 4. Size exclusion chromatography
- 5. Thin layer chromatography
- 6. Cation exchange chromatography

- (B) P-5, Q-3, R-6, S-1
- (D) P-6, Q-5, R-2, S-4

Q.15. In the two half reactions



(F = 23,063 cal/V)

The ΔG° for coupled reaction will be

- (A) +7,400 cal
- (B) -7,400 cal
- (C) -22,200 cal
- (D) +22,200 cal

Q.16. Match the parameters in **Group 1** with the correct options in **Group 2**

**Group 1**

- P. K<sub>M</sub>
- Q. k<sub>cat</sub>/K<sub>M</sub>
- R. pK<sub>a</sub>
- S. K<sub>i</sub>

- (A) P-3, Q-1, R-2, S-4
- (C) P-1, Q-2, R-4, S-3

**Group 2**

- 1. Catalytic efficiency of the enzyme
- 2. Affinity of enzyme to the inhibitor
- 3. Affinity of enzyme to the substrate
- 4. Maximum buffering capacity

- (B) P-3, Q-1, R-4, S-2
- (D) P-1, Q-4, R-2, S-3

Q.17. The rise per residue of α-helix is about 1.5 Å. A protein spans 4 nm bilayer 7 times through its transmembrane α-helical domain. Approximately, how many amino acid residues constitute the transmembrane domain of the protein

- (A) 105
- (B) 450
- (C) 30
- (D) 190

Q.18. Match the proteins in **Group 1** with their correct functions in **Group 2**

**Group 1**

- P. Shaker protein
- Q. Bacteriorhodopsin
- R. Porin
- S. ABC transporter

**Group 2**

- 1. Inner membrane receptor
- 2. Active transport
- 3. Voltage gated  $K^+$  channel
- 4. Light driven  $H^+$  pump
- 5. Membrane fusion
- 6.  $\beta$ -barrel simple diffusion channel

(A) P-4, Q-2, R-3, S-5

(B) P-5, Q-3, R-4, S-6

(C) P-6, Q-1, R-5, S-4

(D) P-3, Q-4, R-6, S-2

Q.19. The metabolic disorders, Alkaptonuria and Phenylketonuria are caused by defects in the enzymes

- P. Glucose- 6-phosphatase
- Q. Phenylalanine hydroxylase
- R. Homogentisate 1,2-dioxygenase
- S. Tyrosinase

(A) Q, R

(B) P, R

(C) P, Q

(D) Q, S

Q.20. Match the metabolic pathways in **Group 1** with the corresponding enzymes in **Group 2**

**Group 1**

- P.  $\beta$ -Oxidation
- Q. Glycolysis
- R. Gluconeogenesis
- S. Calvin cycle

**Group 2**

- 1. Ribulose biphosphate carboxylase
- 2. Phosphofructokinase 1
- 3. Phosphoenol pyruvate carboxykinase
- 4. Thiolase
- 5. Phosphofructokinase 2

(A) P-4, Q-2, R-3, S-5

(B) P-3, Q-2, R-4, S-1

(C) P-3, Q-1, R-5, S-2

(D) P-4, Q-2, R-3, S-1

**END OF SECTION – I**