

XE-A: Q. 1 – Q. 7 carry one mark each & Q. 8 – Q. 11 carry two marks each.

XE (B to H): Q. 1 – Q. 9 carry one mark each & Q. 10 – Q. 22 carry two marks each.

XL-P: Q. 1 – Q. 5 carry one mark each & Q. 6 – Q. 15 carry two marks each

XL (Q to U): Q. 1 – Q. 10 carry one mark each & Q. 11 – Q. 20 carry two marks each.

Q.1 Catalase is found exclusively in

- (A) Lysosomes
- (B) Golgi apparatus
- (C) Peroxisomes
- (D) Mitochondria

Ans. C

Q.2 RAG recombinase is responsible for the formation of specific immune receptors. This process occurs in

- (A) T cells & B cells
- (B) Natural killer cells
- (C) Macrophages
- (D) Neutrophils

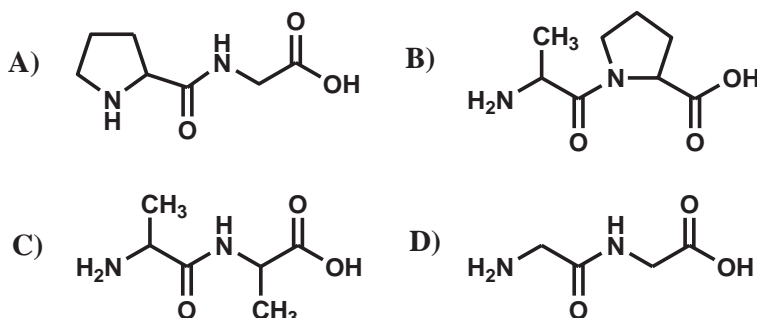
Ans. A

Q.3 The example of substrate level phosphorylation in glycolysis is

- (A) Conversion of Glucose to Glucose-6-phosphate
- (B) Conversion of Glyceraldehyde-3-phosphate to 1,3-Bisphosphoglycerate
- (C) Conversion of 1,3-Bisphosphoglycerate to 3-Phosphoglycerate
- (D) Conversion of Dihydroxyacetone phosphate to Glyceraldehyde-3-phosphate

Ans. C

Q.4 The dipeptide with least rotational barrier in the peptide bond is



Ans. B

- Q.5 The light-harvesting pigment **NOT** used by Cyanobacteria for photosynthesis is
- (A) Rhodopsin
 - (B) Phycobilin
 - (C) Phycoerythrobilin
 - (D) Phycocyanobilin

Ans. A

- Q.6 Slow intravenous infusion of ethanol is a therapy to treat methanol poisoning. The underlying chemical reaction is an example of
- (A) Competitive inhibition
 - (B) Non-competitive inhibition
 - (C) Mixed inhibition
 - (D) Enzyme activation

A

- Q.7 Nitric oxide synthase is responsible for generation of Nitric oxide, an important signaling molecule. The substrate for this enzyme is
- (A) Glycine
 - (B) Lysine
 - (C) Histidine
 - (D) Arginine

Ans. D

- Q.8 Allergies are due to a hyper immune response. Drugs given to counter allergies target
- (A) Glycine
 - (B) Histamine
 - (C) Insulin
 - (D) Cellulose

Ans. B

- Q.9 The electrostatic interaction energy between a positively charged atom A and negatively charged atom B separated by 3 Å in water is -6 kJ/mol. Considering the relative permittivity of water to be 80, the electrostatic interaction energy in kJ/mol (rounded off to one decimal place) between atoms A and B in vacuum is _____.

Ans. -480.1 TO -479.9

- Q.10 You are given a 0.1M solution of Glucose (stock solution). The stock solution required to make 0.5 ml of 0.005M Glucose solution (rounded off to three decimal places) in ml is _____.

Ans. 0.024 TO 0.026

Q.11 A mixture of the following purified proteins, IgG, IgM and Fab fragment of immunoglobulins, is separated using gel filtration chromatography. The order of elution of these proteins (first to last) is

- (A) Fab fragment, IgM and IgG
- (B) IgM, IgG and Fab fragment
- (C) Fab fragment, IgG and IgM
- (D) IgG, IgM and Fab fragment

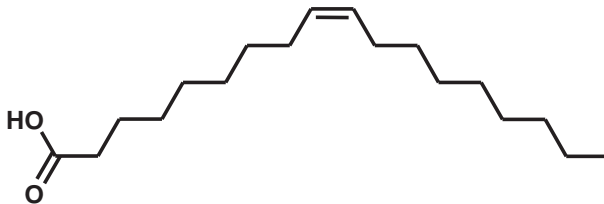
Ans. B

Q.12 The ascending order of half-life for the radioactive isotopes, ^{125}I , ^3H , ^{14}C and ^{32}P , is

- (A) $^{14}\text{C} < ^{125}\text{I} < ^3\text{H} < ^{32}\text{P}$
- (B) $^{32}\text{P} < ^3\text{H} < ^{125}\text{I} < ^{14}\text{C}$
- (C) $^{14}\text{C} < ^3\text{H} < ^{32}\text{P} < ^{125}\text{I}$
- (D) $^{32}\text{P} < ^{125}\text{I} < ^3\text{H} < ^{14}\text{C}$

Ans. D

Q.13 The enzyme **NOT** involved in oxidation of the molecule shown below is



- (A) Δ^3, Δ^2 - Enoyl -CoA isomerase
- (B) Propionyl-CoA carboxylase
- (C) Acyl CoA dehydrogenase
- (D) Enoyl CoA hydratase

Ans. B

Q.14 DpnI is used to digest the PCR product during site directed mutagenesis because

- (A) DpnI digests irrespective of methylation status of DNA
- (B) DpnI digests only unmethylated DNA
- (C) DpnI digests only methylated DNA
- (D) DpnI digests GC-rich sequences

Ans. C

Q.15 Which one of the following is an **incorrect** biomolecule-modification pair?

- (A) Lipid - Palmitoylation
- (B) DNA and Protein - Methylation
- (C) Protein - Glycosylation
- (D) RNA - Polyadenylation

Ans. A

Q.16 The crystal structure of a peptide has an ordered structural repeat of amino acids with a distance of $\sim 6.5 \text{ \AA}$ between the alternate C_α atoms. Which one of the following pair of dihedral angles (Φ and Ψ) accurately represents the peptide structure?

- (A) $\Phi \approx -60^\circ$, $\Psi \approx -50^\circ$
 (B) $\Phi \approx -120^\circ$, $\Psi \approx -50^\circ$
 (C) $\Phi \approx -60^\circ$, $\Psi \approx +120^\circ$
 (D) $\Phi \approx -120^\circ$, $\Psi \approx +120^\circ$

Ans. D

Q.17 Absence of detectable protein expression upon blunt-ended mutation-free cloning of an *E. coli* gene with its own promoter in *E. coli* cells can be due to

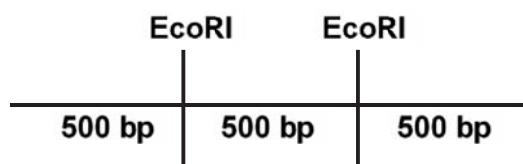
- (A) Cloning occurred in reverse orientation
 (B) Cloning occurred out of frame
 (C) Codon bias
 (D) Rapid degradation of expressed protein

Ans. D

Q.18 The C-terminal carboxyl group and the N-terminal amino group in amino acids have a dissociation constant (pK_a) of 2.2 and 9.2, respectively. The pK_a of side chain carboxyl group in glutamic acid is 4.2 and side chain amino group in lysine is 10.2. The difference in isoelectric point (pI) of lysine and glutamic acid (rounded off to two decimal places) is ____.

Ans. 6.49 TO 6.51

Q.19 X different sized DNA fragments can be observed upon incomplete EcoRI digestion of identical DNA molecules with two EcoRI sites as shown below. The maximum value of X is ____.



Ans. 3 TO 3

Q.20 An uncharged protein (P) has an Asp in position 23 with a molecular weight of 6501 Da, as determined by mass spectrometry. The uncharged mutant of this protein (P') contains a single amino acid substitution with Asn at position 23. The molecular weight of P', as determined by mass spectrometry (rounded off to one decimal place) is ____ Da.

Ans. 6499.9 TO 6500.1

END OF THE QUESTION PAPER