Previous Year Solved Question Paper

of

G.A.T.E. (XL) 2018

LIFE SCIENCES

XL: Biochemistry

Examination

(Original Question Paper with Answer Key)

GRADUATE APTITUDE TEST IN ENGINEERING

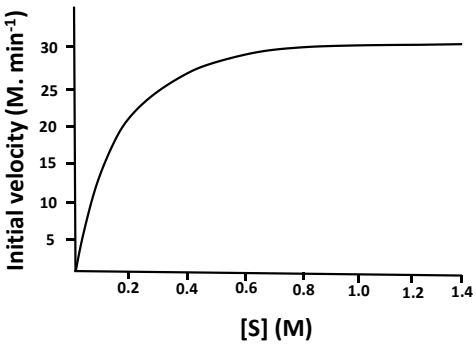
Q. 1 – Q. 10 carry one mark each & Q.11 - Q.20 carry two marks each.

Q.1 To which one of the following classes of enzymes does chymotrypsin belong?

(A) Oxidoreductase (B) Hydrolase (C) Transferase (D) Isomerase

Ans. B

Q.2 The substrate saturation profile of an enzyme that follows Michaelis-Menten kinetics is depicted in the figure. What is the order of the reaction in the concentration range between 0.8 to 1.4 M?



(A) Zero (B) Fraction (C) First (D) Second

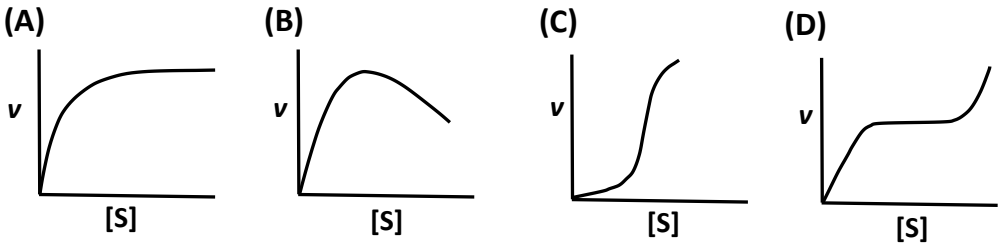
Ans. A

Q.3 Which one of the following conformations of glucose is most stable?

(A) Boat (B) Half Chair (C) Chair (D) Planar

Ans. C

Q.4 Which one of the following profiles represent the phenomenon of cooperativity?



Ans. C

Q.5 Which one of the following amino acids is responsible for the intrinsic fluorescence of proteins?

(A) Pro (B) Met (C) His (D) Trp

Ans. D

Q.6 The glycosylation of the proteins occurs in_____.

(A) glyoxysomes (B) lysosomes
(C) Golgi apparatus (D) plasma membrane

Ans. C

Q.7 Which one of the following properties of the myeloma cells is used in the hybridoma technology to generate monoclonal antibody?

(A) lack of thymidylate synthase
(B) over-expression of hypoxanthine-guanine phosphoribosyl transferase
(C) over-expression of inosine 5´-monophosphate cyclohydrolase
(D) lack of hypoxanthine-guanine phosphoribosyl transferase

Ans. D

Q.8 The movement of protons through the F_oF_1-ATPase during mitochondrial respiration is required for ____

(A) the increase in pH of mitochondrial matrix.
(B) changing the conformation of F_oF_1-ATPase to expel the ATP.
(C) importing P_i from inter membrane space.
(D) decreasing the affinity of ADP to F_oF_1-ATPase.

Ans. B

Q.9 The number of $NADP^+$ molecules required to completely oxidize one molecule of glucose to CO_2 through pentose phosphate pathway is ____ (correct to integer number).

Ans. 12 to 12

Q.10 Measurement of the absorbance of a solution containing NADH in a path length of 1cm cuvette at 340 nm shows the value of 0.31. The molar extinction coefficient of NADH is 6200 M^{-1} cm^{-1}. The concentration of NADH in the solution is ___ µM (correct to integer number).

Ans. 50 to 50

Q. 11 – Q. 20 carry two marks each.

Q.11 Among the reagents given below which one of the combination of reagents will **NOT** break the disulphide bonds in the immunoglobulin molecules?

(P) Reduced glutathione (Q) Dithiothritol
(R) Sodium dodecyl sulphate (S) Methionine

(A) R&S (B) P&R (C) P&S (D) Q&R

Ans. A

Q.12 Match the protein elution condition given in **Group I** with the appropriate chromatography matrices from **Group II**.

	Group I		**Group II**
P	Increasing concentration of sodium chloride	**i**	Phenyl-Sepharose
Q	Increasing concentration of histidine	**ii**	Chromatofocusing
R	Decreasing concentration of ammonium sulphate	**iii**	DEAE-Sephacryl
S	Decreasing concentration of H^+	**iv**	Ni-NTA

(A) P-iii; Q-iv; R-i; S-ii (B) P-ii; Q-iv; R-i; S-iii
(C) P-i; Q-ii; R-iii; S-iv (D) P- iv; Q-ii; R-iii; S-i

Ans. A

Q.13 Which one of the following is **NOT** a neurotransmitter?

(A) Adrenaline (B) Glutamate (C) Histamine (D) Histidine

Ans. D

Q.14 The type-II hypersensitivity reaction is mainly mediated by____.

(A) IgE (B) IgM (C) IgA (D) T cells

Ans. B

Q.15 Which one the following reaction mechanisms drives the conversion of low energy 3-phosphoglyceraldehyde to high energy 1,3-bisphosphoglycerate?

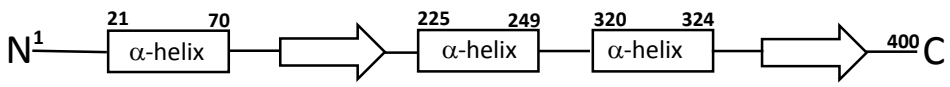
(A) Oxidation without anhydride bond formation
(B) Oxidation coupled with anhydride bond formation
(C) Substrate level phosphorylation
(D) Formation of carboxylate

Ans. B

Q.16 A polymerase reaction is carried out for 10 cycles in a volume of 1 ml with 5 molecules of template DNA. Assuming that the efficiency of the reaction is 100 %, the number of molecules of DNA present in 100 μl at the end of the reaction is ___ (correct to integer number).

Ans. 512 to 512

Q.17 The secondary structure topology diagram of 400 amino acid long "Protein-X" is depicted in the figure. The start and end amino acid residue numbers of each α-helix are marked. The percentage (correct to integer number) of residues forming α-helix is____.



Ans. 20 to 20

Q.18 An enzyme follows Michaelis-Menten kinetics with substrate S. The fraction of the maximum velocity (V_{max}) will be observed with the substrate concentration [S] = $4K_m$ is _____ (correct to one decimal place). (K_m is Michaelis-Menten constant)

Ans. 0.8 to 0.8

Q.19 The mass spectrum of benzoic acid will generate the fragment as a base peak (100% relative abundance) of *m/z* (mass to charge ratio) at ____ (correct to integer number).

Ans. 77 to 77

Q.20 The standard free energy (ΔG´) values of reactions catalyzed by citrate lyase and citrate synthetase are -670 and -8192 cal/mol, respectively.

$$\text{Citrate} \xrightleftharpoons{\text{Citrate lyase}} \text{Acetate + Oxaloacetate} \quad \Delta G_1' = -670 \text{ cal/mole}$$

$$\text{Acetyl-CoA + Oxaloacetate + } H_2O \xrightleftharpoons{\text{Citrate synthetase}} \text{Citrate + CoA} \quad \Delta G_2' = -8192 \text{ cal/mole}$$

The standard free energy (in cal/mol) of acetyl-CoA hydrolysis is ___ (correct to integer number).

Ans. -8862 to -8862

END OF THE QUESTION PAPER