



MAE-679

Seat No. _____

B. Sc. (Sem. III) Examination

October / November - 2018

Biotechnology : CCC - I - 3

(Cellular Metabolism - 1)

Time : 3 Hours]

[Total Marks : 70

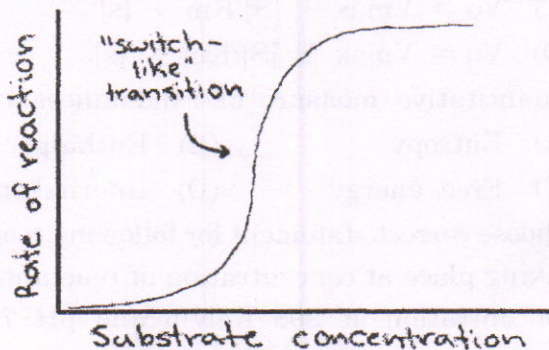
1 Solve the following :

15

(1) What is location of glycolytic pathway in bacteria ?

- (A) Cytoplasm
- (B) Mitochondrial matrix
- (C) Cytoplasm
- (D) Cell membrane

(2) Identify correct statement for following figure :



- (A) Enzyme follows MM kinetics
- (B) Enzyme does not follow MM kinetics
- (C) Enzyme is an allosteric enzyme
- (D) Both (B) and (C)

- (3) For spontaneous reaction free energy change should be
- (A) Negative (B) Positive
(C) Zero (D) None of the above
- (4) Identify correct equation :
- (A) Holoenzyme = Apoenzyme + Cofactor
(B) Apoprotein = Holoenzyme + Cofactor
(C) Apoprotein + Holoenzyme
(D) Apoenzyme + Enzyme + coenzyme
- (5) How many ATP molecules can be synthesized by oxidative phosphorylation during aerobic respiration of glucose ?
- (A) 1 (B) 30
(C) 8 (D) 38
- (6) Identify correct MM equation.
- (A) $V_o = V_{max} \times [S]/K_m + [s]$
(B) $V_o = K_m + [s]/V_{max} \times [S]$
(C) $V_o = V_{max} + [S]/K_m + [s]$
(D) $V_o = V_{max} \times [S]/K_m \times [s]$
- (7) Quantitative measure of randomness is
- (A) Entropy (B) Enthalpy
(C) Free energy (D) Internal energy
- (8) Choose correct statement for following reaction taking place at concentration of reactants 1M concentration at 298 Kelvin and pH 7
- (A) Concentration of P will increase
(B) Concentration of Q will increase
(C) No change in concentration of reactants.
(D) Initially concentration of P increases then there will be increase of Q

- (9) Which enzyme catalyzes first step of TCA cycle ?
 (A) Hexokinase (B) Citrate synthase
 (C) Citrate synthetase (D) None of the above
- (10) Alpha chain and Beta chain of haemoglobin have _____ and _____ amino acid residues, respectively.
 (A) 141 and 147 (B) 147 and 141
 (C) 288 and 288 (D) 288 and 147
- (11) Give one example of Competitive inhibition.
- (12) Define: Allosteric Enzymes.
- (13) Define: Gluconeogenesis.
- (14) Define: Thermodynamics.
- (15) Define: Cofactor.

2 Answer the following in brief : (any **five**) **10**

- (1) State second Law of Thermodynamics.
- (2) Lock - Key Model of Enzyme action.
- (3) What is covalent modification of enzymes ?
- (4) How many ATPs are produced through GTP and FADH₂ during TCA ?
- (5) Give two differences between endothermic and exothermic reactions.
- (6) Enzymes are specific in their action : Justify.
- (7) Show the reaction of alcohol fermentation.

3 Write short notes on following : (any **five**) **25**

- (1) ATP is a Universal energy currency of the biological system : Justify.
- (2) Classification of Enzymes.
- (3) Quaternary structure of Hemoglobin.
- (4) Just draw glycolysis pathway with proper labelling.
- (5) Effect of temperature and pH on enzyme activity.
- (6) State first law of thermodynamics and explain it.
- (7) Pentose Phosphate Pathway.

4 Give detailed accounts on following : (any **two**) **20**

- (1) Explain effect of substrate concentration on enzyme activity; derive MM equation and explain about K_m and V_{max} .
- (2) Define enzyme inhibition. Explain types of reversible inhibition of enzymes.
- (3) Explain TCA cycle and calculate net ATP production.