

Indian Institute of Science Education and Research Kolkata

LS2101 Biochemistry Midterm Examination— Autumn 2018

Name:

Roll Number:

I pledge on my honor that I will not give or receive any unauthorized assistance while writing this examination.

Signature and Date

Marks:

Q1 -	/ 10
Q2 -	/ 5
Q3 -	/ 5
Total =	/ 20

Q. 1

Signature

1. (10 pts)

(a; 1 pt) We used the Steady State Approximation and the conservation of total enzyme concentration in deriving the Michaelis-Menten equation. Write down equations for the SSA and the conservation of enzyme.

(b; 3 pts) Do you need to know E_T (total enzyme) to determine (circle Y or N for each and justify):

K_m (Y/N)

V_{max} (Y/N)

k_{cat} (Y/N)

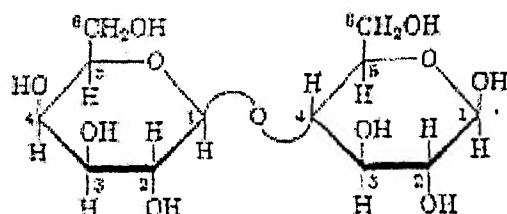
c. (1.5 pt) Consider the MM equation at low substrate concentration to explain why top-performing enzymes all have similar k_{cat}/K_m values even though their individual k_{cat} and K_m parameters vary widely. What is the operational definition of “low substrate concentration” in this context?

d. (0.5 pt) What is the significance of k_{cat}/K_M ?

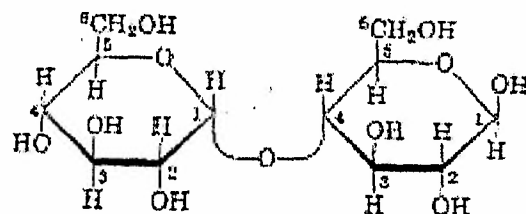
e. 4 pts

Name the monosaccharides that these disaccharides are composed of

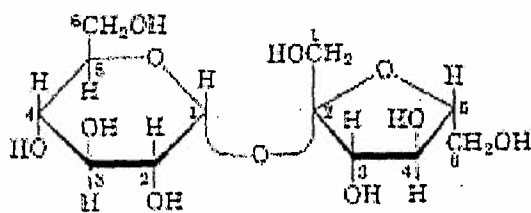
(don't forget to indicate their stereoisomer form)



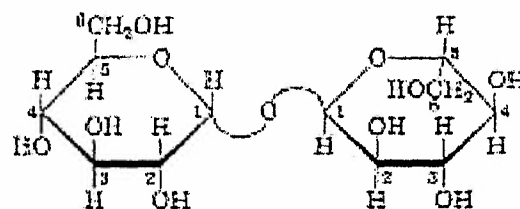
Lactose



Maltose



Sucrose



Trehalose

Lactose _____

Sucrose _____

Maltose _____

Trehalose _____

Which of these disaccharides (if any) contain

Pentose _____

an aldose _____

a pyranose _____

a furanose _____

a ribose _____

a ketose _____

a L-stereoisomer _____

Q2. Draw the nature of the titration curve as function of increasing $[\text{OH}^-]$ concentration and all the ionization forms for the following amino acid: Leucine, Lysine and Aspartic acid.

Indicate the pI for each of the above amino acids.

[5]

Amino Acids	pK_{a1}	pK_{a2}	pK_{a3}
Leucine	2.36	9.60	
Lysine	2.18	8.95	10.79
Aspartic acid	2.09	9.82	3.86

Q3 a) Explain why double stranded RNA cannot adopt A-form of helix?

[2]

b) For the given alpha helical peptide, where would you put the following amino acids that will make a stable helix , Gly, Ser, Ala, Leu, Val, Ala, Ile. Provide a brief explanation

[3]

