



Reg. No. 

--	--	--	--	--	--	--	--	--	--

The Open University of Sri Lanka

B. Sc. Degree Programme - 2015/2016

Faculty of Natural Sciences

Department of Chemistry

CMU3126 – Biochemistry

CONTINUOUS ASSESSMENT TEST I

Ques. No.	Max.	Marks
1	40	
2	40	
3	20	
<b>Total</b>	100	

Date: 9<sup>th</sup> (Sunday) October 2016

Time: 9.00.a.m. – 10.00 a.m.

1. The kinetics of enzyme catalyzed reactions is given by Michaelis-menten equation.  
a) Define all the terms in the Michaelis-menten equation given below.

$$V_o = \frac{v_{max} [S]}{k_m + [S]}$$

(10 marks)

- b) The  $K_m$  of hexokinase for ATP as substrate is 0.4 mM. But the  $K_m$  of hexokinase for  $\text{HCO}_3^-$  as substrate is 1.5 mM. Explain.

(5 marks)

- c) The following experimental data were collected during a study of the catalytic activity of catalase with the substrate,  $\text{H}_2\text{O}_2$ .

$[\text{H}_2\text{O}_2]/\text{mM}$	1.5	2.0	3.0	4.0	8.0	16.0
Velocity/ ( $\mu\text{mol}/\text{min}$ )	0.21	0.24	0.28	0.33	0.40	0.45

i) Derive the equation for the Lineweaver-Burk plot from the Michaelis-menten equation.

(5 marks)

ii) Use a graphical analysis with the graph papers provided to determine the  $K_m$  and  $V_{max}$  for this reaction.

(20 Marks)

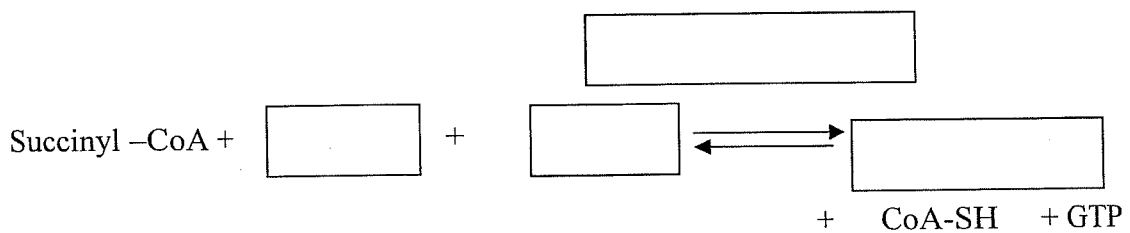
**(Total 40 marks)**

2. The Citric acid cycle is a pathway for oxidation of acetyl CoA.

a) Give two sources of acetyl CoA in human body.

(10 Marks)

b) i) Complete the following reaction of substrate level phosphorylation of Succinyl -CoA in the Citric acid cycle.



(16 Marks)

Reg. No.

--	--	--	--	--	--	--	--	--	--

ii) The standard Gibbs free energy change ( $\Delta G^{\circ}$ ) for this reaction is  $-2.9\text{kJ/mol}$ . What can you say about the feasibility of this reaction? Explain.

(4 Marks)

iii) How is the Gibbs free energy contained in GTP incorporated into the cellular ATP pool? Give the appropriate equation.

(10 Marks)

**(Total 40 marks)**

3. a) Name the two shuttles operated in the cell to transport NADH released from glycolysis in the cytosol to the mitochondria.

b) Explain **ONE** of the shuttles mentioned above.

**(Total 20 marks)**

\*\*\*\*\*

Reg. No. 

--	--	--	--	--	--	--	--	--	--

Name : .....

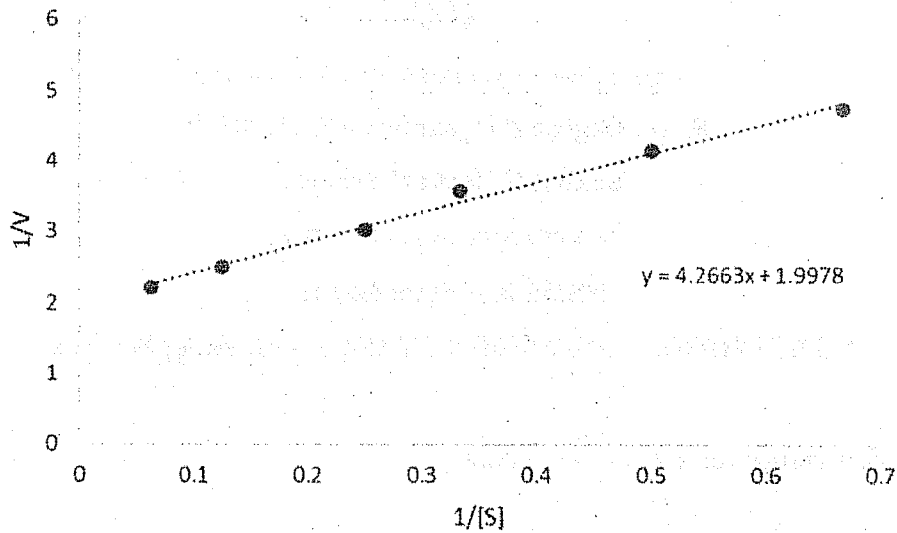
Address : .....

.....

.....

Reg. No.

--	--	--	--	--	--	--	--	--	--



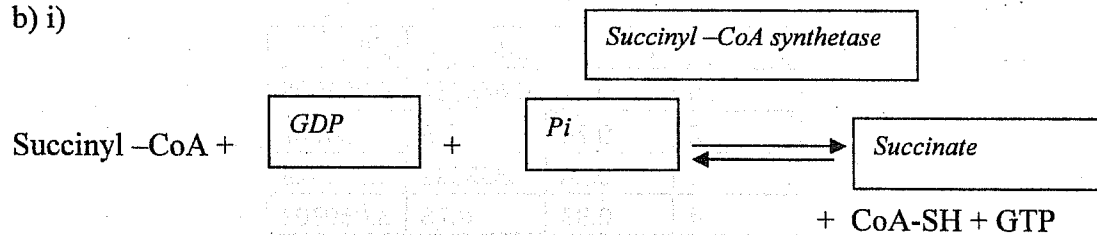
$$K_m = 2.14 \text{ mM}$$

$$V_{\max} = 0.5 \text{ } \mu\text{mol/min}$$

2. a) Any two of  
 Glycolysis  
 $\beta$  Oxidation  
 amino acid metabolism

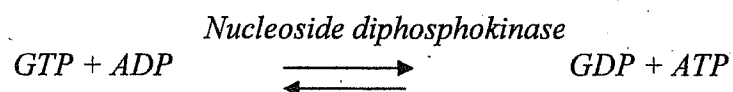
or Any two of  
 glucose  
 protein  
 fatty acids

b) i)



ii) This reaction is feasible as the  $\Delta G^\circ$  is a negative value.

iii)



3. a) Unit 1, session 4, Pages 26 -28

b) Unit 1, session 4, Pages 26 -28