

CORK INSTITUTE OF TECHNOLOGY
INSTITIÚID TEICNEOLAÍOCHTA CHORCAÍ

Autumn Examinations 2014

Module Title: Metabolic Biochemistry CA

Module Code: BIOL6017

School: Science

Programme Title: Bachelor of Science in Applied Biosciences
Bachelor of Science (Honours) in Herbal Science
Bachelor of Science (Honours) in Pharmaceutical Biotechnology
Bachelor of Science (Honours) in Nutrition and Health Science

Programme Code: **SBIOS_7_Y2**
SHERB_8_Y2
SPHBI_8_Y2
SNHSC_8_Y2

External Examiner(s): Dr. Cormac Gahan
Internal Examiner(s): Dr. Fiona O Halloran

Instructions: Answer Section A (compulsory) and THREE questions from Section B.

Duration: 2 Hours

Sitting: Autumn 2014

Requirements for this examination: Scientific Calculator, Graph Paper

Note to Candidates: Please check the Programme Title and the Module Title to ensure that you have received the correct examination paper.
If in doubt please contact an Invigilator.

Section A (40 marks)

Q1. (compulsory) Answer all parts.

- (a) The following data was generated for an enzyme catalysed reaction involving the enzyme malate dehydrogenase. Using the data construct a Michaelis-Menten plot and a Lineweaver-Burke plot and determine the K_m and V_{max} values for the reaction catalysed. Which method would you describe as more accurate, explain your answer.

[Substrate] (μM)	v_o ($\mu\text{mol/ml/min}$)
2.0	0.150
4.0	0.200
8.5	0.275
12.5	0.315
17.0	0.340
20.0	0.350
80.0	0.360

(20 marks)

- (b) A Glucose Hexokinase assay was performed to estimate the blood glucose levels of two patients (patient A and patient B). The following data was generated. Using the data construct a calibration curve and estimate the blood sugar levels for both patients (analysed in triplicate). Using the information provided comment on the validity of the assay and on the patients tests results.

Sample	Concentration (mmol/Lt)	Absorbance @ 340nm
Standard 1	2.8	0.1
Standard 2	5.7	0.210
Standard 3	8.3	0.334
Standard 4	11.1	0.500
Standard 5	13.9	0.586
Standard 6	16.7	0.788
Control sample	-	0.25
Patient A (1)	-	0.15
Patient A (2)	-	0.175
Patient A (3)	-	0.172
Patient B (1)	-	0.60
Patient B (2)	-	0.625
Patient B (3)	-	0.585

Control reference range; 5.19-7.03 mmol/Lt

Normal blood glucose reference range (adult); 4.0 – 5.9mmol/Lt

(20 marks)

Section B (60 marks)

Answer any three questions.

Q2.

- (a) In relation to enzymes define the following terms: holoenzyme, prosthetic group, zymogen, apoenzyme, active site.

10 Marks

- (b) Using two examples you have studied describe two important enzyme characteristics

10 Marks

Q3.

- (a) Draw a summary of the citric acid cycle.

10 Marks

- (b) Show where in the cycle CO_2 and reducing power are produced, and which steps control the rate of the cycle.

10 Marks

Q4.

- (a) State the 'Chemiosmotic theory'.

8 Marks

- (b) Describe the three metabolic control points in Glycolysis, naming the substrate, enzyme and product in each case

12 Marks

- Q5.** (a) What is meant by 'standard reduction potential'?

5 Marks

- (b) Describe the sequence of events that occur within the electron transport chain to facilitate the transfer of electrons to the terminal electron acceptor

15 Marks