Charles Darwin University

Final Examination

Family Name						
Given Name/s						
Student Number						
Teaching Period	Semester 2, 2017					

SBI105 – The Life of Cells	DURATION	
	Reading Time:	10 minutes
	Writing Time:	120 minutes
INSTRUCTIONS TO CANDIDATES		
EXAM CONDITIONS		
You may begin writing from the commencement of the examination session. The reading time indicated above is provided as a guide only.		
This is a CLOSED BOOK examination		
No calculators are permitted		
No handwritten notes are permitted		
No dictionaries are permitted		
ADDITIONAL AUTHORISED MATERIALS	EXAMINATION MATERIALS TO BE SUPPLIED	
No additional printed material is permitted	1 x 8 Page Book Faculty/School Multiple Choice Answer Sheet	

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Section A
Multiple Choice Questions
Total Number of Marks for this section: Fifty (50)

This section should be answered on the Answer Sheet provided. Each question is worth one (1) mark as indicated. Suggested time allocation for this Section 45 mins

Section B
True/False
Total Number of Marks for this section: Twenty (20)

This section should be answered on the Exam paper in the space provided. Indicate if the statement is true or false. If you believe the statement is false please justify your response.

Each question is worth two (2) marks. Suggested time allocation for Section A: 15 mins

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Question 1

Intracellular second messaging systems always use a G-protein
(2 Marks)

True False

Question 2

Operons only occur in prokaryotic organisms.
(2 Marks)

True False

Question 3

The pH of blood is maintained by amino acid.
(2 Marks)

True False

Question 4

A population is made up of multiple individuals.
(2 Marks)

True False

Question 5

All protein transported across a membrane require energy.
(2 Marks)

True False

Question 6

Carbohydrates can be used for hormone synthesis.

True False

(2 Marks)

Question 7

A nucleosome is made of histones, DNA, and chromatin.
(2 Marks)

True False

Question 8

Epithelial cells in the kidney and skin are both cuboidal.
(2 Marks)

True False

Question 9

Meiosis occurs in all cells of the body.
(2 Marks)

True False

Question 10

Mechanoreceptors only occur in the skin of humans.
(2 Marks)

True False

This is the end of Section B

Section C

Short Answer Questions

Total No of Marks for this section: One hundred and Twenty- (120)

This section should be answered on the Exam paper in the space provided when indicated otherwise use the provided booklet.

Each question is worth the marks indicated. Suggested time allocation for Section B: 60 mins

Question 1

Draw and label an animal cell. Explain the function of four different organelles.

(16 Marks)

Question 2

By means of a fully-labelled diagram, describe the physical and chemical structure of a plasma membrane (or cell membrane). Why is it described as a 'fluid mosaic'? Explain how each component of the membrane contributes to the movement of substances across membranes.

(20 Marks)

Question 3

Cellular respiration is an energy generating process with carbon dioxide produced as a by-product. Explain with the aid of a diagram the link between CO_2 and energy production.

(13 Marks)

Question 4

Explain the process of DNA replication in prokaryotic cells and where it occurs.

(13 Marks)

Question 5

Ribosomes are critically important for translation. Indicate how the structure of a ribosome makes it so well suited for its function.

(6 Marks)

Question 6

Name three types of RNA and explain their function

(6 Marks)

Question 7 Answer this question here

Please circle 'Yes' or 'No', to indicate your agreement with the following statements.

a) All proteins have a primary structure. Yes No

b) All proteins have a secondary structure. Yes No

c) All proteins have a tertiary structure. Yes No

d) All proteins have a quaternary structure. Yes No

(4 Marks)

Question 8

Based on the following DNA sequence, please answer all four questions below.

5'-GACTAATTTATCCAACGAGCATCCATGGAT-3'

a) Indicate the 5' and 3' ends on the sequence provided. (1Mark)

b) Write the mRNA sequence which encodes a complete protein. (3 Marks)

c) What is the sequence of the complete protein? (6 Marks)

d) Indicate a change in the original DNA sequence which would result in a silent mutation. (1 Mark)

Question 9

I have recently discovered a novel organism, as it was isolated from the dairy located in Saskatoon. I have chosen to name it *Staphylococcus Saskatonian*. This organism is a human pathogen, common symptoms include increased friendliness towards strangers and improved performance in SBI105 exams. I was having difficulty growing the organism on a milk based medium, to overcome this I decided to add some of the metabolism genes from *E.coli* in an attempt to improve growth. I added the lac operon include all regulatory elements. The genetically modified *Staphylococcus Saskatonian* is growing in a glass of milk. How is the bacterium generating glucose to undergo glycolysis? There is no glucose or other sugars added to the media.

(10 Marks)

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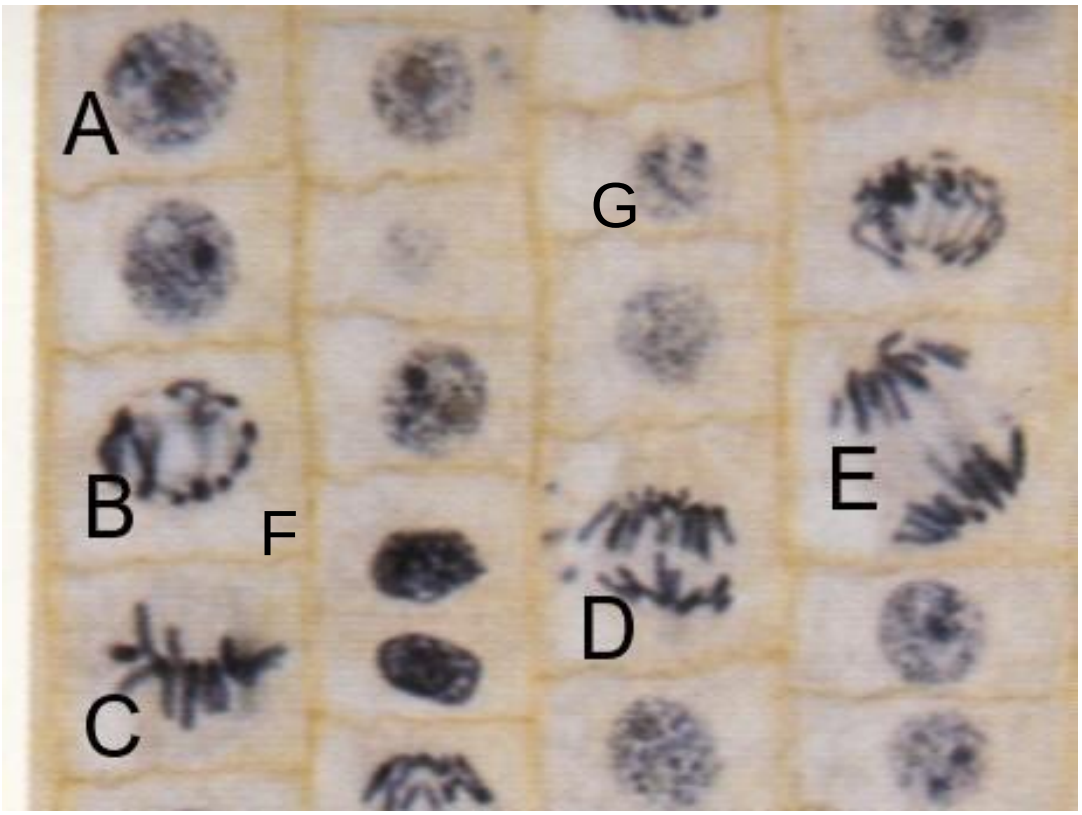
Question 10

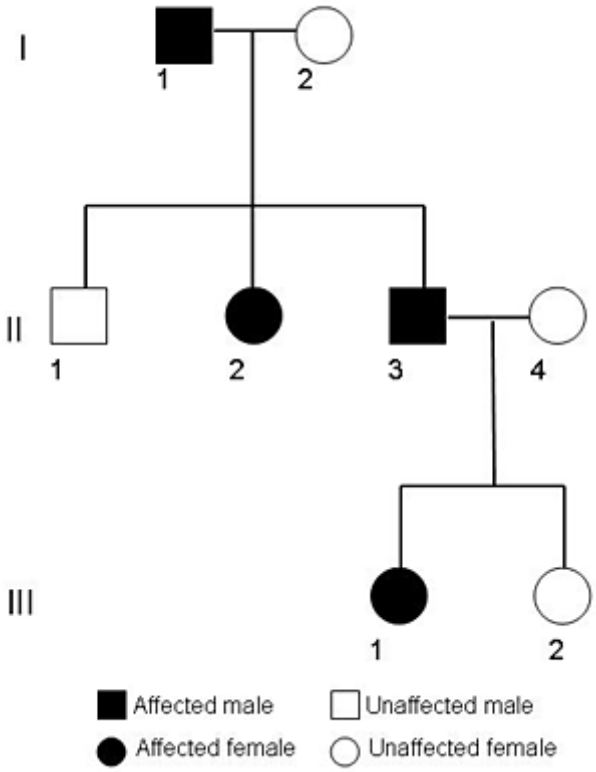
Please put all the labelled cells (A, B, C, D, E, F and G) into order from the start of mitosis to the end of mitosis. What phase is each cell in?

(8 Marks)



Question 11

Based on the family tree presented, please answer the following questions.



a) What type of inheritance is this?

(1 Mark)

b) Please indicate the genotypes for each person.

(4 Marks)

Question 12

A pure bred pea plant producing purple robust flowers (FFDD) is fertilised by a pea plant producing white delicate flowers (ffdd).

a) What types of gametes are produced by the F_1 generation

(1 Mark)

b) If you observed 10,000 flowers on the F_2 generation, – what is the phenotype and in what ratio do you expect to find them?

(4 Marks)

c) What conditions need to be met for the ratios you predicted in question (b) to be true?

(3 Marks)

This is the end of Section C

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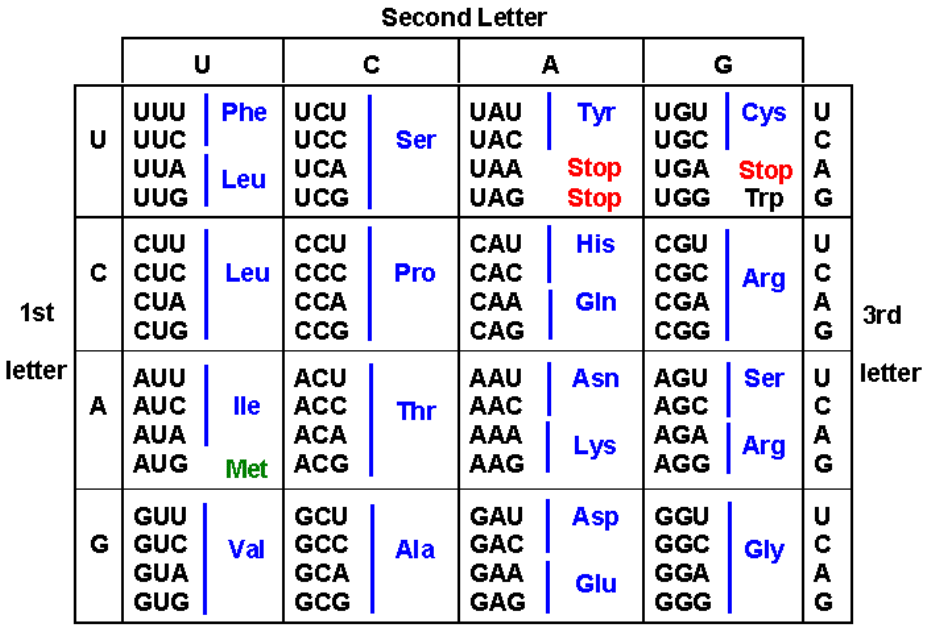
Appendix 1 – Amino acids

Amino acid	Three letter code	One letter code
alanine	ala	A
arginine	arg	R
asparagine	asn	N
aspartic acid	asp	D
asparagine or aspartic acid	asx	B
cysteine	cys	C
glutamic acid	glu	E
glutamine	gln	Q
glutamine or glutamic acid	glx	Z
glycine	gly	G
histidine	his	H
isoleucine	ile	I
leucine	leu	L
lysine	lys	K
methionine	met	M
phenylalanine	phe	F
proline	pro	P
serine	ser	S
threonine	thr	T
tryptophan	trp	W
tyrosine	tyr	Y
valine	val	V

Appendix 2 – Genetic code Resources



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