

FACULTY OF INDUSTRIAL SCIENCES & TEACHNOLOGY

FINAL EXAMINATION

COURSE	:	CELL AND MOLECULAR BIOLOGY
COURSE CODE	:	BSB1163
LECTURER	:	NOOR SUHANA BINTI ADZAHAR NORMAIZA BINTI ZAMRI
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DURATION	:	3 HOURS
SESSION/SEMESTER	:	SESSION 2016/2017 SEMESTER II
PROGRAMME CODE	:	BSB

INSTRUCTIONS TO CANDIDATES:

1. This question paper consists of **TWO (2) PARTS**.
PART A: Answer **ALL** questions.
PART B: **TWO (2)** choices of questions. Answer **ONE (1)** question only.
2. All answer to a new question should start on new page.

APPENDIX

The Codon Table

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This examination paper consists of **SIX (6)** printed pages including front page.

PART A**Answer All Questions.****QUESTION 1**

Virus cannot multiply unless they invade a specific host cell and instruct its genetic and metabolic machinery to make and release new viruses.

- (a) Define 'virion'.
(2 Marks)
- (b) Draw a diagram of the naked nucleocapsid virus and label all the components.
(2 Marks)
- (c) Briefly describe **THREE (3)** different treatments for animal viral infection.
(6 Marks)

QUESTION 2

Cell membranes are selectively permeable to only allow certain molecules crossing into and out of the cell. Molecules are able to pass through a selectively permeable membrane either via active or passive transport mechanisms.

- (a) Briefly describe **FOUR (4)** factors that will increase diffusion rate across plasma membrane.
(8 Marks)
- (b) Describe **TWO (2)** types of channel proteins that facilitate diffusion across plasma membrane.
(4 Marks)
- (c) Explain the mechanism where large particles are transported out of the membrane.
(8 Marks)

QUESTION 3

The cell cycle is a series of events that take place in a cell leading to its division and duplication of its DNA to produce two daughter cells. To ensure the proper division of the cells, there are control mechanisms known as cell cycle checkpoints. Discuss in detail of all the checkpoints.

(10 Marks)

QUESTION 4

The genetic material of a eukaryotic cell is contained in a set of chromosomes containing many genes encoding their respective proteins.

- (a) Briefly explain about DNA packaging **and** the components involved.

(4 Marks)

- (b) Based on **Figure 1**, describe in detail the **FOUR (4)** steps in protein translation.

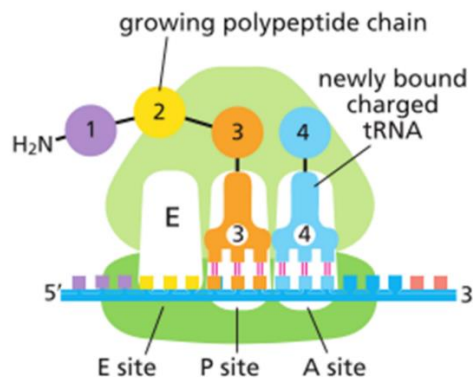


Figure 1: Position of the translational site in the large ribosome complex.

(16 Marks)

QUESTION 5

Mutation can cause many implications on the cell functions by blocking replication or transcription of essential genes.

- (a) Compare and contrast between missense **and** silent mutations.

(8 Marks)

- (b) There is a case where a mutation is found in a tRNA-encoding gene. The wild type allele produces a tRNA that recognizes the codon GAA, and is charged with the Glutamic acid (Glu). The mutant tRNA is still charged with Glu, but the anticodon is mutated such that it recognizes the codon UAA that produce mutated protein.

- (i) Explain this situation in a suitable diagram.
- (ii) Briefly describe the characteristics of the mutated protein produced.
- (iii) Briefly explain **TWO (2)** possible effects to the cells if this mutation occur in essential gene related to cell growth.

(12 Marks)

PART B**Answer ONE (1) Question Only.****QUESTION 1**

The plasma membrane borders the entire cell separating the internal environment from the external environment.

- (a) Explain how the structure **and** properties of phospholipids help to maintain the structure of cell membranes. **(10 Marks)**
- (b) Explain the different methods that cells use to restrict proteins to specific regions of the plasma membrane. **(8 Marks)**
- (c) Describe the fluidity of membrane containing many restricted proteins. **(2 Marks)**

QUESTION 2

Dr Chen, scientist from Malaysian Genome Institute recently joined an expedition to Taman Negara. During his trip, he discovered some unique leaves from unknown plant and he interested to study the molecular properties of the plant.

- a) Suggest a suitable investigation method to analyse the genetic variability of the plant compared with other known plants. **(12 Marks)**
- b) After studying on the molecular properties of the plants, Dr Chen discovered that the unique plant consist of high protein X. He extracted the protein and decided to purify that protein X with affinity chromatography technique. Illustrate how affinity chromatography works. **(8 Marks)**

END OF QUESTION PAPER

Appendix 1

The codon table

		Second letter				
		U	C	A	G	
First letter	U	UUU } Phe UUC } UUA } Leu UUG }	UCU } UCC } Ser UCA } UCG }	UAU } Tyr UAC } UAA Stop UAG Stop	UGU } Cys UGC } UGA Stop UGG Trp	U C A G
	C	CUU } CUC } Leu CUA } CUG }	CCU } CCC } Pro CCA } CCG }	CAU } His CAC } CAA } Gln CAG }	CGU } CGC } Arg CGA } CGG }	U C A G
	A	AUU } AUC } Ile AUA } AUG Met	ACU } ACC } Thr ACA } ACG }	AAU } Asn AAC } AAA } Lys AAG }	AGU } Ser AGC } AGA } Arg AGG }	U C A G
	G	GUU } GUC } Val GUA } GUG }	GCU } GCC } Ala GCA } GCG }	GAU } Asp GAC } GAA } Glu GAG }	GGU } GGC } Gly GGA } GGG }	U C A G
						Third letter