UTHM
Universiti Tun Hussein Onn Malaysia

UNIVERSITI TUN HUSSEIN ONN MALAYSIA

FINAL EXAMINATION
(ONLINE)
SEMESTER I
SESSION 2020/2021

COURSE NAME	:	INTRODUCTION TO BIOTECHNOLOGY
COURSE CODE	:	DAK 23803
PROGRAMME CODE	:	DAK
EXAMINATION DATE	:	FEBRUARY 2021
DURATION	:	2 HOURS 30 MINUTES
INSTRUCTION	:	ANSWER **ALL** QUESTIONS.

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THIS QUESTION PAPER CONSISTS OF **FIVE (5)** PAGES

Q1   *X process* is a genetic engineering method used to produce offspring which possess characteristics listed in **Figure Q1**.

(a) Identify *X process* and its function.

(2 marks)

(b) *Y process* is used to merge the gene of interest from the *X process* into other DNA Distinguish the *Y process*.

(1 mark)

(c) *Z* is used to mass-produce the DNA in the *Y process*. Identify **five (5)** types of *Z*.

(5 marks)

(d) Outline the steps involve in the *Y process*.

(10 marks)

(e) NEWRule Vaccine Research Institute wishes to produce a vaccine for the *Q disease* using the *Y process* and *Escherichia coli*. Given the size of the *Q disease* antigen gene is 8-15kb. Based on your answer from **Q1 (d)**, select the most suitable DNA to be used for this activity and describe the characteristics for the chosen answer.

(7 marks)

Q2   **Figure Q2** describe the characteristic of the *P process* which uses carbohydrate as the main source to produce energy-carrying molecules. Illustrate and explain the *P process*.

(25 marks)

Q3   **Figure Q3** summarized the advantages of the *R method* in research and development activities involving the use of cell and tissue engineering approaches. In order to execute the *R method*, an environment that mimics its natural growth conditions with adequate amount of nutrients is provided.

(a) Identify **five (5)** nutrients required and its functions if the *R method* is applied on two (2) different large-sized eukaryotes.

(20 marks)

(b) Differentiate **five (5)** characteristics of eukaryotes mentioned in **Q3 (a)**.

(5 marks)

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Q4   **Figure Q4** shows the structure of biomolecules labelled as *Compound A, B* and *C* which execute different functions in eukaryotes.

(a) Identify the group of biomolecules for compounds in **Figure Q4**.

(1 mark)

(b) Based on the structure of compounds in **Figure Q4,**

(i) Identify the functional group present in *Compound A* and *C*.

(1 mark)

(ii) Differentiate *Compound B* from *C* in terms of its functional group.

(1 mark)

(iii)Distinguish the process which binds the structure from your answer in **Q4 (a)** and **Q4 (b) (i)**.

(1 mark)

(c) Distinguish the process (or location) where *Compound A, B* and *C* are utilized. Complete and reconstruct **Table Q4 (c)** in your answer sheet.

(6 marks)

(d) The characteristics of the *T molecule* are summarized in **Figure Q4 (d)**. The combination of several *T molecules* produces a *U compound* which accelerates the conversion of *R material* to *S product* in a bioreactor.

(i) Identify *U compound*.

(1 mark)

(ii) As a process engineer, outline **five (5)** parameters that should be monitored to optimize the velocity of *S product* production. Support your answer with the aid of diagrams.

(10 marks)

(iii) Based on your answer in **Q4 (d) (i)**, discuss **four (4)** possible factors that lead to the denaturation of the *U compound*.

(4 marks)

- **END OF QUESTIONS –**

X process
• Lack of genetic diversity
• Inherit 100% of hereditary diseases
• Lack of infection resistance

Figure Q1

P process
• Cytosol
• Matrix
• Adenosine triphosphate

Figure Q2

R method
• Species specific
• Replacement for studies on living organism
• Less time consuming and rapid test

Figure Q3

FINAL EXAMINATION

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Compound A	Compound B	Compound C
O	O=CH	O
OHCH	OHCH	OHCH
HCOH	HCOH	HCH
HCOH	HCOH	HCOH
HCOH	HCOH	HCOH
HCH	HCH	HCH
PO_3^{2-}	PO_3^{2-}	PO_3^{2}
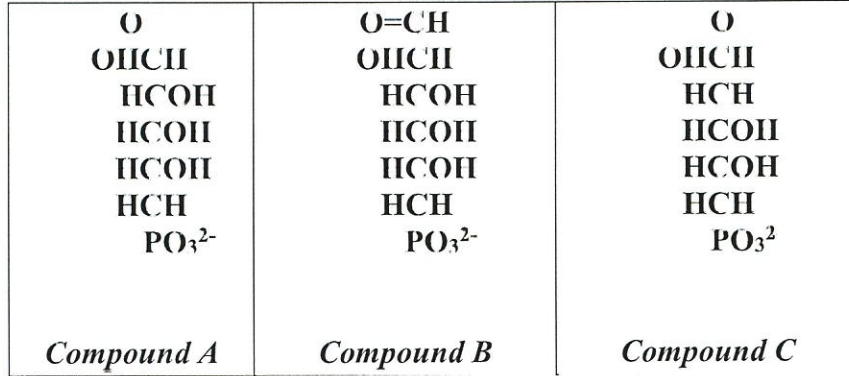
Figure Q4

Table Q4 (c)

Name of Compound	Name of Process/ Location	Function
A		
B		
C		

T molecule
• HOC=O
• H-N-H

Figure Q4 (d) (i)