



UTHM

Universiti Tun Hussein Onn Malaysia

UNIVERSITI TUN HUSSEIN ONN MALAYSIA

FINAL EXAMINATION SEMESTER I SESSION 2022/2023

- COURSE NAME : INTRODUCTION TO BIOTECHNOLOGY
- COURSE CODE : DAK 23803
- PROGRAMME CODE : DAK
- EXAMINATION DATE : FEBRUARY 2023
- DURATION : 2 HOURS 30 MINUTES
- INSTRUCTIONS :
1. ANSWER ALL QUESTIONS
 2. THIS FINAL EXAMINATION IS CONDUCTED VIA **CLOSED BOOK**.
 3. STUDENTS ARE **PROHIBITED** TO CONSULT THEIR OWN MATERIAL OR ANY EXTERNAL RESOURCES DURING THE EXAMINATION CONDUCTED VIA CLOSED BOOK

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

TERBUKA

CONFIDENTIAL

Q1 *P procedure* is a genetic engineering procedure used to produce genetically modified organism that possess characteristics listed in **Table Q1**.

- (a) Identify *P* and its function. (2 marks)
- (b) *Q process* is used to merge the gene of interest from the *P procedure* into other DNA. Outline the process involved in *Q process*. (1 mark)
- (c) *R* is used as a vehicle to transport and mass produce the DNA produced from *Q process*. Identify **five (5)** types of *R*. (5 marks)
- (d) Outline the steps involved in the *Q process*. (10 marks)
- (e) NEWNorm Pharmaceutical wish to produce a *G hormone* to treat *Z disease* using *Q process* and *Escherichia coli*. Given the size of the gene that expressed the *G hormone* is 8kb to 15kb. Select the most suitable DNA to be used for this activity and describe the characteristics of the chosen answer. (7 marks)

Q2 Tissue culture is a method of biological research in which fragments of tissue from an animal or plant are transferred to an artificial environment in which they can continue to survive and function.

- (a) Identify the possible sources of plant tissue culture. (4 marks)
- (b) Explain the characteristics of a determinate organ. (4 marks)
- (c) Explain **two (2)** applications of plant tissue in terms of research, commercial and economic aspect. (6 marks)
- (d) Differentiate the characteristics of organised and unorganized culture cells. (4 marks)
- (e) *H Plant Tissue Corporation* produces genetically modified carrots and wishes to re-grow the plant using the tissue culture technique. Illustrate a diagram on the steps involved in the procedure. (7 marks)

Q3 Biomolecules which consist of hydrocarbons as its building blocks are vital in maintaining the functions of cells in eukaryotes.

- (a) Based on **Figure Q3 (a)**,
- (i) Identify compound *A*. (1 mark)
 - (ii) Identify **two (2)** functions of compound *A*. (2 marks)
 - (iii) The combination of monomers of compound *A* produces water as the by product. Identify the process involved. (1 mark)
 - (iv) Based on your answer in the **Q3 (c)**, draw a complete reaction of the said process involving two identical compound *A* with six carbons. (4 marks)
- (b) Based on **Figure Q3 (b)**,
- (i) Identify compound *B*. (1 mark)
 - (ii) Identify **two (2)** functions of compound *B*. (2 marks)
 - (iii) The polymerization of compound *B* produces a compound that may exist in quaternary structure. Identify the **two (2)** types of bonding which holds its tertiary structure. (2 marks)
 - (iv) Unsuitable processing conditions may cause the denaturation of the polymerized compound *B*. Discuss the conditions that cause the denaturation of polymerized compound *B*. (5 marks)
- (c) The backbone structure of the deoxyribose nucleic acid (DNA) is composed of the alternating units of deoxyribose with phosphate group. Draw the structure of the monomer subunit of DNA. (1 mark)
- (d) A unit of nucleotide consists of a sugar, phosphate group and nitrogenous base. Illustrate the structure of a nucleotide with its compatible pair if ribose sugar is present. (2 marks)

- (e) The polymerization of multiple nucleotides produces nucleic acid. Based on your answer in **Q3 (d)**, illustrate the polymerization reaction of nucleotides. (4 marks)

Q4 Basic classes of biology cells are consisting of eukaryote and prokaryote.

- (a) Define eukaryote and prokaryote. (2 marks)
- (b) List **three (3)** differences between prokaryote and eukaryote. (6 marks)
- (c) Eukaryotic cells are larger than prokaryotic cells. Relate the reasons contributing to this characteristic. (2 marks)
- (d) Distinguish between the processes involved for prokaryotes and eukaryotes to reproduce. With the aid of a diagram, draw and explain the steps involved in each process. (15 marks)

- END OF QUESTIONS -

FINAL EXAMINATION

SEMESTER / SESSION : SEM 1 / 2022/2023
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Characteristics of Offspring

- Lack of genetic diversity
- Inherit 100% of hereditary diseases
- Lack of infection resistance

Table Q1

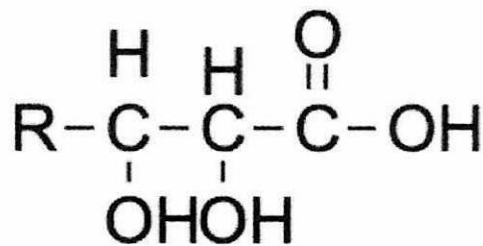
COMPOUND A

Figure Q3 (a)

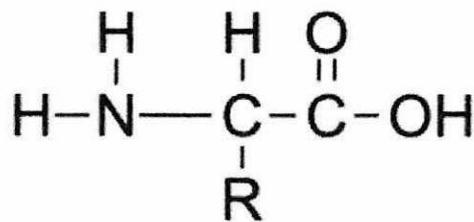
COMPOUND B

Figure Q3 (b)