

University of Ruhuna- Faculty of Technology
Bachelor of Biosystems Technology Honours Degree
Level 2 (Semester II) Examination, November / December - 2023
Academic year 2021/2022

Course Unit: BST 2253 – Gene Technology (Theory) Duration: 2 hours

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Please read and follow the **instruction** carefully before answering the questions.

- Answer **All Three (3)** questions in **PART 1** in the given space.
- Answer Only **Two (2)** questions in **PART 2**.
- Use separate book for answering the questions in **PART 2**.
- Each question should be started with a new page.
- Calculators and mobile phones are not allowed

PART 1 – Answer All questions

Question 01 (100 Marks)

I. Mention three (03) main differences between DNA and RNA **(15 Marks)**.

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II. Define the term “Gene” **(05 Marks)**.

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III. What is meant by “genetic engineering” **(10 Marks)**.

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IV. Fill in the following table mentioning **two (02)** applications in gene technology in each sector **(30 Marks)**.

Sector	Application
Medicine	
Industry	

II. Explain the role of genetically modified *Bacillus thuringiensis* (Bt) bacteria in bioremediation **(10 Marks)**.

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III. Fill in the following table by giving three **purposes** of developing genetically modified crops and **two (02)** examples for each purpose **(30 Marks)**.

Generation	Main purpose	Examples
First generation		
Second generation		
Third generation		

IV. Mention **two (02)** main reasons of using *Drosophila melanogaster* as a model organism to study the effects of genetic changes on development **(10 Marks)**.

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V. Point out **three (03)** possible health risks of genetically modified organisms **(30 Marks)**.

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Question 03 (100 Marks)

I. Mention **three (03)** techniques used for sample lysis in DNA extraction protocol **(30 Marks)**.

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II. Point out the importance of centrifugation in DNA extraction **(10 Marks)**.

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III. Write down three (03) methods that can be applied to purify the DNA from the mixture **(30 Marks)**.

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IV. What is the most effective method to remove RNA from a cell extract **(10 Marks)**?

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V. Explain the answer in part IV **(20 Marks)**.

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PART 2 – Answer two (02) questions only

Question 01 (100 Marks)

- I. What is the expected outcome in using blotting techniques in molecular biology work? **(10 Marks).**
- II. Briefly mention the working principle behind the southern blotting technique **(20 Marks).**
- III. List out the main steps of southern blotting **(10 Marks)**
- IV. Briefly explain the purpose and the importance of each step mentioned in part III **(60 Marks).**

Question 02 (100 Marks)

- I. What is “Gene cloning” **(10 Marks)?**
- II. Diagrammatically illustrate the basic steps of gene cloning **(30 marks).**
- III. Differentiate sticky end and blunt end **(10 Marks).**
- IV. Write a brief account on ‘Blue- White’ screening methodology in identification of transformed bacterial colonies **(50 Marks).**

Question 03 (100 Marks)

Write down short notes on followings

- I. Genetically modified fish **(25 Marks)**
- II. Genetically modified bacteria as living drugs **(25 Marks)**
- III. Structure of DNA **(25 Marks)**
- IV. Synthetic Biology Vs. Computational Biology **(25 Marks)**

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