

NATIONAL UNIVERSITY OF SCIENCE AND TECHNOLOGY

FACULTY OF APPLIED SCIENCES

DEPARTMENT OF ENVIRONMENTAL SCIENCE AND HEALTH

SUPPLEMENTARY EXAMINATION

BIOTECHNOLOGY AND THE ENVIRONMENT: ESH 4209

July 2012

Time Allowed: 3 hours

Total Marks: 100

INSTRUCTIONS:

Answer any FOUR questions. Each question carries 25 marks. Where a question contains subdivisions, the mark value for each subdivision is given in brackets. Illustrate your answer appropriate with large, clearly labelled diagrams

Question 1

Write short notes on the following:

- i)The central dogma of molecular genetics (10 marks)
- ii)DNA polymerases (10 marks)
- iii)Eukaryotic gene structure (5 marks)

Question 2

“Selectable markers and reporter genes are indispensable in biotechnology but can pose challenges in environmental release of biotechnology products”. Discuss this assertion.

Question 3

Describe the methods used to genetically transform animals and discuss their limitations.

Question 4

- a)Briefly describe the direct and indirect environmental effects of genetically modified crops. (10 marks)
- b)Describe the barriers to gene flow employed in managing the release of genetically modified crops into the environment. (15 marks)

Question 5

Write an essay on the sampling and testing procedures for GMOs in bulk grain imports.

Question 6

Briefly describe the contents of a complete GMO information dossier you would submit to a regulatory authority as part of an application for environmental release of a GMO crop.

End of Examination

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Question 1

- a) Describe the gene transfer events that are encountered in the genetic transformation of plants. **(10 marks)**
- b) Write a short essay on the creation of protoplasts and their use in plant genetic transformation. **(15 marks)**

Question 2

Outline any **TWO** methods that are used to detect the presence of GMOs in food samples and discuss their advantages and disadvantages.

Question 3

Write an essay on the ecology of GMO crops and their environmental impacts.

Question 4

- a) Outline the characteristics of confined field trials of GMO crops. **(10 marks)**
- b) Discuss the risk mitigation goals for confined field trials of GMO crops **(15 marks)**

Question 5

Briefly outline the major provisions of **FIVE** international binding legal instruments on biosafety.

Question 6

Describe the scientific basis and impact of any **TWO** traits of genetically modified crops that are being exploited in different countries

End of Examination