

UNIVERSITY OF RUHUNA

BACHELOR OF SCIENCE (GENERAL) DEGREE LEVEL III (SEMESTER II)
EXAMINATION – JANUARY 2018

SUBJECT: BOTANY

COURSE UNIT: GENETIC ENGINEERING AND BIOTECHNOLOGY (BOT 3271)

Time: One hour and thirty minutes (1.5 h)

Index No.:

Answer ONLY two questions (2) including question no. (1)

(1). Answer all questions.

(i) Define following terms.

Forward genetics:

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Reverse genetics:

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Recombinant DNA (rDNA):

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Recombinant DNA (rDNA) technology:

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(ii) What are restriction enzymes and what is their role in nature?

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(iii) What information you could obtain from the name of '*EcoRI* restriction enzyme?

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(iv) What is the role of restriction enzymes in recombinant DNA technology?

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(v) What do you understand by 'sticky' and 'blunt' ends of a DNA fragment resulting after a restriction enzyme digestion?

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(vi) What are DNA ligases and use of ligases in recombinant DNA technology?

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(vii) What is a 'cloning vector'?

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(viii) What will be the consequence of not having an origin of replication (ori) in a cloning vector?

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(ix) Define following terms associated with cloning vectors.

Multiple cloning site:

Selectable marker:

(x) Mention two major limitations of λ phage cloning vectors.

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(xi) Explain how those (above) limitations have been overcome in λ phage cloning vectors?

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(xii) What is meant by following terms in genetic engineering?

Transformation:

Competent cells:

(xiii) Mention two methods of making competent cells.

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(xiv) A plasmid vector used in a cloning experiment contains ampicillin and chloramphenicol resistant genes. After transformation, bacterial colonies were visible on ampicillin containing medium but not on chloramphenicol containing medium. How would you explain this observation?

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(xv) Name three important regions on the *Ti* plasmid of *Agrobacterium tumefaciens*.

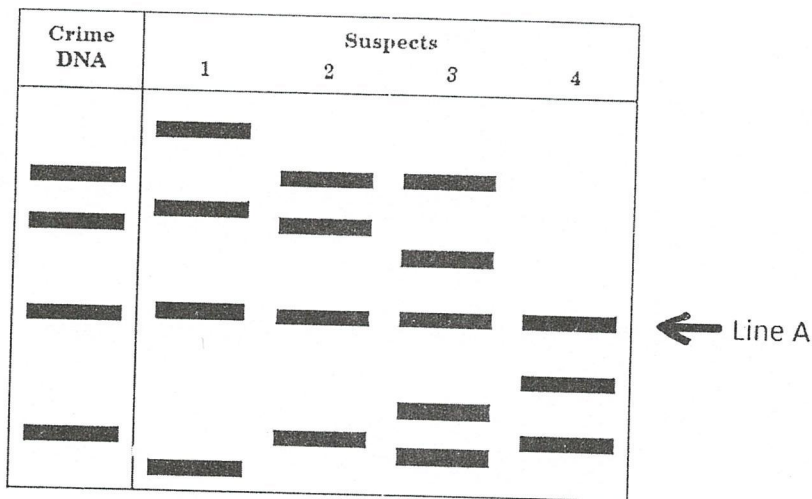
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(2). Answer all questions.

- (i) Explain briefly what is gene therapy?
- (ii) Name two methods of transgene delivery in gene therapy.
- (iii) Give three types of viral vectors commonly used in gene therapy.
- (iv) What is RNA- ribozymes? Using a suitable diagram explain the role of RNA-ribozyme in “targeted inhibition of gene expression” during gene therapy treatment.

(3). Answer all questions.

- (i) Explain the major steps of the experimental procedure in DNA fingerprinting.
- (ii) Following figure shows the DNA fingerprint of sperms collected from a raped victim (crime DNA) and four suspects.



- a) Who is the real rapist? Give reasons for your answer.
- b) DNA bands of the line “A” indicated in the figure are identical for all four suspects. What would be the reason/s for that?