

UNIVERSITY OF RUHUNA

BACHELOR OF SCIENCE (SPECIAL) DEGREE LEVEL I (SEMESTER II) EXAMINATION
- JANUARY 2018

SUBJECT: BOTANY

COURSE UNIT: GENETIC ENGINEERING AND BIOTECHNOLOGY (BOT 4122)

Time: Two hour (2 h)

Index No.:

Answer ONLY three (3) questions including question no. (1)

(1)

(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 ~~participate~~ 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:

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Selectable marker:

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(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 contained ampicillin and chloramphenicol resistant genes. After transformation, bacterial colonies were visible on ampicillin containing medium but not on chloramphenicol containing medium. How could you explain this observation?

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(xv) The DH5- α strain of *E. coli* is widely used in gene cloning experiments. A mutation named lacZ Δ M15 in this strain allows blue-white screening of recombinant pUC8 vector. How could you explain this?

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(xvi) What are the functions of X-gal and IPTG in 'blue-white screening' of recombinant cells?

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

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(xviii) What property of *Ti* plasmid stimulated scientists' interest in developing *Ti* plasmid as a cloning vector for higher plants?

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2. Answer all questions.
- (i) Briefly explain 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. You are given a task to screen a particular gene ('X') from a bacterial isolate for which no sequence information is available. You are provided with a pure culture of bacteria and a radioactively labeled antibody for the 'X' protein. Elucidate how do you screen this gene from the given bacterial isolate?
4. Describe the importance of transgenic animals in the fields of medicine, agriculture and industry.