

SCT 412-3 Enzyme and DNA recombinant Technology

Number of questions: six (06) essay questions

Answer all the questions

Time allocation: Three (03) hours

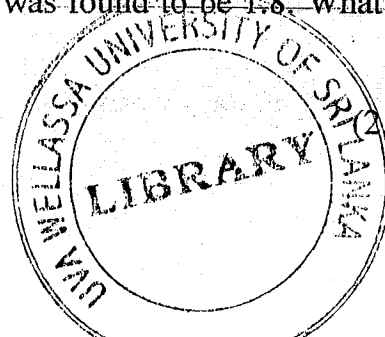
Mark allocation: 120

1.

- a. Explain how chromosome structure regulates gene expression in Eukaryotes
(10 mark)
- b. Compare and contrast the differences between eukaryotic and prokaryotic gene expression.
(05 mark)
- c. What do you mean by “C-value paradox”?
(05 mark)

2.

- a. What are the types of DNA that you work with in Recombinant DNA Technology?
(05 mark)
- b. Describe a stepwise procedure of a DNA isolation method based on adsorption chromatographic technique.
(10 mark)
- c. A sample of DNA was found to have an absorbance of 1 at 260 nm. What would be the approximate weight of DNA in 1 mL of this sample?
(2.5 mark)
- d. The $A_{260} : A_{280}$ ratio of a dsDNA sample was found to be 1.8. What could be said about the purity of this sample?
(2.5 mark)



a. What are type II restriction endonucleases?

(05 mark)

b. Describe the nomenclature of type II restriction endonuclease "*HindII*".

(05 mark)

c. The recognition sequence of a type II restriction endonuclease is given below:



i. Name the specific type II restriction endonuclease for the above recognition sequence.

ii. Draw the resulting cut.

(05 mark)

d. Briefly explain how you could modify a blunt end to facilitate ligation?

(05 mark)

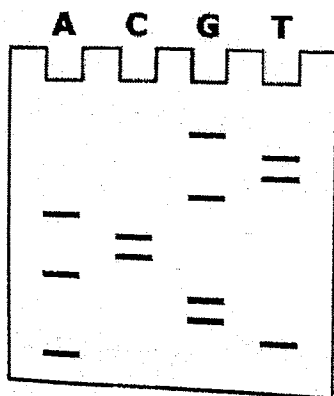
a. What is DNA sequencing?

(2.5 mark)

b. Describe giving all the details of the stepwise process and explain how you could find the sequence of a given piece of dsDNA using chain termination (Sanger) method.

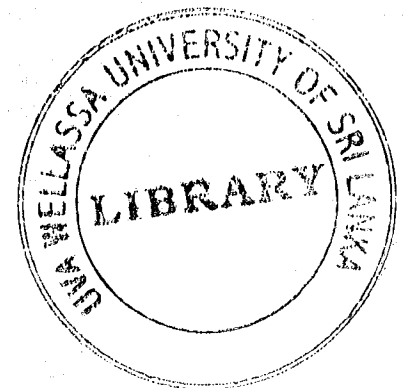
(15 mark)

c. The gel product of a sequencing experiment is given below:



Deduce the sequence of the new strand and the original strand.

(2.5 mark)



5. A scientist produced a transgenic tobacco plant by inserting a disease resistant gene he has isolated from a wild relative of tobacco plants. The method he used to deliver the resistant gene was *Agrobacterium*-mediated-gene-transfer. This method often results in multiple copy insertion of the transgene (resistant gene). The scientist wants to find out the following:

1. Whether the transgene is present in the plant he produced.
2. If the transgene is present, how many copies of it is there in the plant.

Describe a method, giving all the details, how he could do this.

(20 mark)

6.

a. Give the five (05) main steps involved in molecular cloning using a plasmid vector.

(05 mark)

b. How do you transfer a recombinant DNA molecule to a host bacteria such as *Escherichia coli*?

(05 mark)

c. Explain the blue white screening (lac-selection) for the identification of recombinant clones.

(15 mark)

