

CORK INSTITUTE OF TECHNOLOGY
INSTITIÚID TEICNEOLAÍOCHTA CHORCAÍ

Autumn Examinations 2013

Module Title: Molecular Biology (CA)

Module Code: GENE 7002

School: Science

Programme Title: Bachelor of Science in Applied Bioscience & Biotechnology
 Bachelor of Science (Honours) in Pharmaceutical Biotechnology

Programme Code: **SBIBI_7_Y3**
 SPHBI_8_Y3

External Examiner(s): **Dr. Gillian Gardiner**

Internal Examiner(s): Dr Brigid Lucey

Instructions: Answer FOUR of the six questions provided. Each question carries equal marks.

Duration: 2 Hours

Sitting: **Autumn 2013**

Requirements for this examination: Calculator

Note to Candidates: Please check the Programme Title and the Module Title to ensure that you have received the correct examination paper.
If in doubt please contact an Invigilator.

- Q1. (a) What are plasmids? (7 Marks)
- (b) Describe a process used in the laboratory for the selective isolation of plasmid DNA from a bacterial cell. (10 Marks)
- (c) Indicate how the size of DNA may be estimated using gel electrophoresis (8 Marks)
- Q2. (a) If an electrophoresis buffer contains Tris at a final concentration of 30 mM, EDTA at a final concentration of 3 mM, Acetic acid at a final concentration of 60 mM. How much of each ingredient (in grams) would you weigh out to make up **1 litre** of the buffer?
*Mole weights of ingredients: Tris (121.1 g/l = 1M);
 EDTA (mw: 372.24g/l = 1M); Acetic acid (60 g(ml)/l = 1M)* (9 Marks)
- (b) When making up a PCR reaction mix to a total volume of 50µL, what volume of each of the following stock reagents would you add:
- 25 mM MgCl₂ to give a final concentration of 3mM
 10x buffer to give a final concentration of 1X
 5U/µL *Taq* DNA polymerase to give a 1Unit final concentration
 100pmol/µL of a primer to give 25pmoles per reaction (12 Marks)
- (c) Why may SYBR green be used to visualise DNA? (4 Marks)
- Q3. (a) Describe what is meant by the lysogenic cycle of phages when they infect the bacterial cell. (13 Marks)
- (b) Give a brief account of THREE diseases caused by the lysogenic conversion of bacteria. (12 Marks)

Q4.(a) Describe how Svedberg units are used to characterise ribosomes. (5 Marks)

(b) Give an account of the mode of action of transfer RNA. (15 Marks)

(c) The standard genetic code determines fewer amino acids than the number of combinations available would suggest. Explain this statement. (5 Marks)

Q5. (a) Give THREE uses for the Polymerase Chain Reaction (PCR). (9 Marks)

(b) Give an account of the principle of PCR amplification. (16 Marks)

Q6. (a) The visualisation of Polymerase Chain Reaction (PCR) Products can be achieved using real time PCR. Explain how this statement is true. (10 Marks)

(b) The visualisation of PCR products can be achieved using a hybridization strip assay. Explain how this statement is true. (15 Marks)