

**CORK INSTITUTE OF TECHNOLOGY**  
**INSTITIÚID TEICNEOLAÍOCHTA CHORCAÍ**

**Examinations 2007/08**

**Module Title:     Molecular Biology**

**Module Code:        MOBI S3001**

**School:                of Science**

**Programme Title:    Bachelor of Science in Applied Biosciences and Biotechnology - Award**

**Programme Code:    SBIBI\_7\_Y3**

**External Examiner(s):     Dr. Tom Beresford**

**Internal Examiner(s):     Dr. Aidan Coffey**

**Instructions: Answer Question 1 and two other questions.**

**Duration:        1.5 HOURS**

**Sitting:           Winter 2007**

**Requirements for this examination:**

**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.

## Section A (Practical molecular biology)

### Q1. (Compulsory).

- (a) Explain the principle behind adsorption columns for isolation of nucleic acids.  
(4 Marks)
- (b) 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 2 litres 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)*  
(4 Marks)
- (c) Why do many buffers in molecular biology contain Tris (tris-hydroxymethyl-aminomethane) and EDTA (Ethylene Diamine Tetra-acetic Acid)?  
(4 Marks)
- (d) Explain step-by-step how would you make up an agarose gel for electrophoresis of DNA?  
(4 Marks)
- (e) A plasmid is isolated from a bacterial culture and electrophoresed on an agarose gel. Explain what the different bands viewed on the agarose gel represent.  
(4 Marks)

## Section B (Molecular Biology Theory)

Answer two of the following questions

- Q2. (a) Give a description of chromosome structure in *E. coli* with specific reference to size, conformation, domains, DNA binding proteins.  
(20 marks)
- (b) Give a description of prokaryotic gene structure.  
(20 marks)
- Q3 Write an essay on Telomeres with particular emphasis on their role, and also the role of telomerase enzyme in cellular aging.  
(40 Marks)
- Q4. Write an essay on bacterial plasmids from the point of view of structure, typical properties encoded, and modes of replication.  
(40 Marks)