

Cork Institute of Technology

Bachelor of Science in Applied Biosciences & Biotechnology

(SBIBI_7_Y3)

Autumn 2008

Molecular Biology

(Time: 1.5 Hours)

Answer **Question 1** and **two** others.

Examiners: Dr. T. Beresford

Dr. A. Coffey

Section A (Practical Molecular Biology)

Q1 (compulsory)

(a) What are the five essential ingredients in a typical PCR reaction? (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 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) (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)

(20 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 the five different enzymes involved in DNA replication in bacteria. (40 Marks)