

UNIVERSITI SAINS MALAYSIA

First Semester Examination
Academic Session 2004/2005

October 2004

BTT 202E/3 - Techniques in Biotechnology
[Teknik-Teknik Bioteknologi]

Duration: 3 hours
[Masa : 3 jam]

Please ensure that this examination paper contains FIVE printed pages.

Answer FIVE out of SIX questions, in English or Bahasa Malaysia.

Each question carries 20 marks.

Sila pastikan bahawa kertas peperiksaan ini mengandungi LIMA muka surat yang bercetak sebelum anda memulakan peperiksaan ini.

Jawab LIMA daripada ENAM soalan yang diberikan, dalam Bahasa Inggeris atau Bahasa Malaysia.

Tiap-tiap soalan bernilai 20 markah.

[BTT 202E/3]

1. Describe the reverse osmosis technology and its application in downstream processing.

(20 marks)

1. *Terangkan teknologi penurasan ultra serta kegunaannya dalam proses hiliran.*

(20 markah)

2. Draw the flow-chart of the purification of a bacterial intracellular protease. Discuss each unit-process involved.

(20 marks)

2. *Lakarkan carta-alir proses penulenan enzim protease yang dihasilkan dalam sel bakteria. Bincangkan setiap proses unit yang terlibat.*

(20 markah)

3. Write notes on gel-filtration and ion-exchange chromatography.

(20 marks)

3. *Tulis nota berkenaan kromatografi penurasan-gel dan pertukaran ion.*

(20 markah)

[BTT 202E/3]

4. (a) A mammalian gene involved in brain development called NAZA is 10,000 long and yet it codes for a protein of 120 amino acid length. Explain this phenomenon.

(5 marks)

- (b) Describe the essential steps to make a cDNA library.

(10 marks)

- (c) Describe how the NAZA cDNA gene can be isolated from the cDNA library above.

(5 marks)

4. (a) *Satu gen mamalia yang mengawal perkembangan otak bernama NAZA mempunyai kepanjangan 10,000 bp tetapi panjang protein yang dikodkan hanya 120 asid amino. Terangkan fenomena ini.*

(5 markah)

- (b) *Terangkan langkah yang perlu untuk membuat perpustakaan cDNA.*

(10 markah)

- (c) *Terangkan bagaimana gen cDNA NAZA boleh dipencil daripada perpustakaan cDNA tersebut.*

(5 markah)

5. (a) Describe three essential features of a plasmid cloning vector.
- (6 marks)
- (b) Describe the essential steps for a Southern analysis and the reason for performing each step.
- (8 marks)
- (c) Describe what will possibly happen to a Southern analysis result if:
- (i) The hybridization temperature is increased to 65°C.
 - (ii) The salt concentration in the hybridization buffer is increased.
- (6 marks)
5. (a) *Terangkan tiga ciri yang perlu ada pada vektor pengklonan plasmid.*
- (6 markah)
- (b) *Terangkan semua langkah yang perlu untuk analisis Southern serta sebab melakukan setiap langkah tersebut.*
- (8 markah)
- (c) *Terangkan apa yang mungkin berlaku kepada keputusan analisis Southern jika:*
- (i) *Suhu penghibridan ditingkatkan kepada 65°C.*
 - (ii) *Kepskatan garam dalam penimbal penghibridan ditingkatkan.*
- (6 markah)

6. Describe the reaction(s) performed by the following proteins and their applications in molecular biological experiments.
- (a) *Thermus aquaticus* (Taq) DNA polymerase
 - (b) S1 nuclease
 - (c) RNAseH
 - (d) Klenow fragment
 - (e) T4 DNA ligase

(20 marks)

6. *Terangkan tindakbalas protein tersebut dan kegunaannya dalam eksperimen biologi molekul:*

- (a) *DNA polymerase Thermus aquaticus (Taq)*
- (b) *S1 nuclease*
- (c) *RNAseH*
- (d) *Serpihan Klenow*
- (e) *T4 DNA ligase*

(20 markah)