

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.*

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[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) *Kepekatan 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)