

UNIVERSITI SAINS MALAYSIA

Second Semester Examination
Academic Session 2004/2005

March 2005

BBT 303E/3 - Plant Molecular Biology
[Biologi Molekul Tumbuhan]

Duration: 3 hours
[Masa : 3 jam]

Please ensure that this examination paper contains EIGHT printed pages.

Answer FIVE out of SIX questions. Candidates are allowed to answer all question in English or Bahasa Malaysia or combination of both.

Each question carries 20 marks.

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

Jawab LIMA daripada ENAM soalan yang diberikan, dalam Bahasa Inggeris atau Bahasa Malaysia atau kombinasi kedua-duanya.

Tiap-tiap soalan bernilai 20 markah.

1. (a) List the steps you would need to perform to do a Southern blot of a plant to detect its homeotic genes.

(15 marks)

- (b) Describe the probe you would use.

(5 marks)

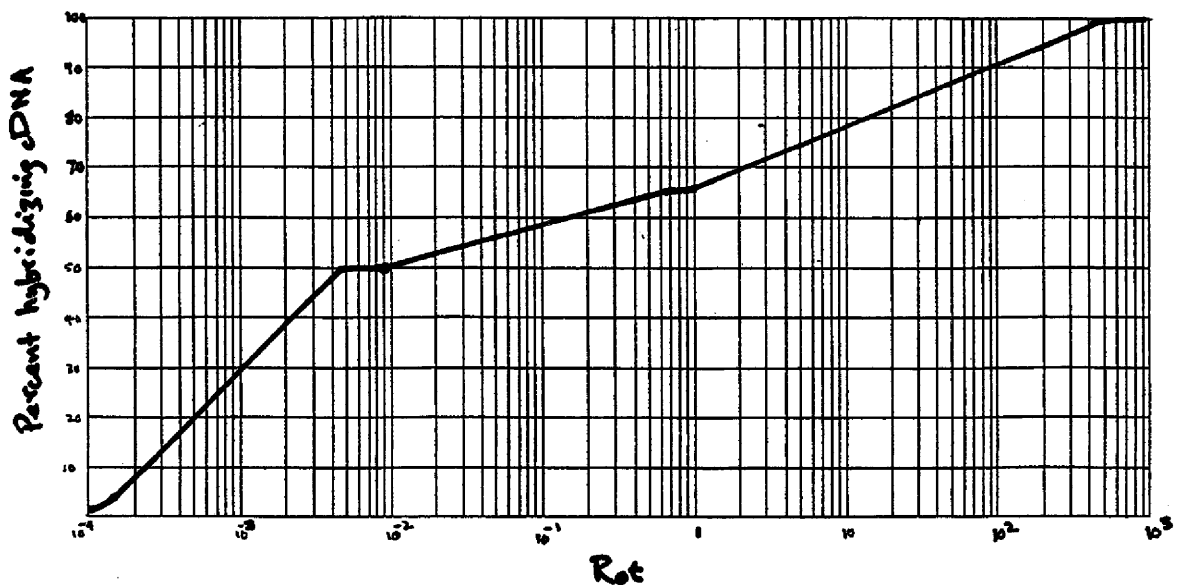
1. (a) *Senaraikan langkah-langkah yang harus diamalkan dalam pembloatan Southern suatu tumbuhan untuk mengesan gen homeotiknya.*

(15 markah.)

- (b) *Huraikan prob yang akan anda gunakan.*

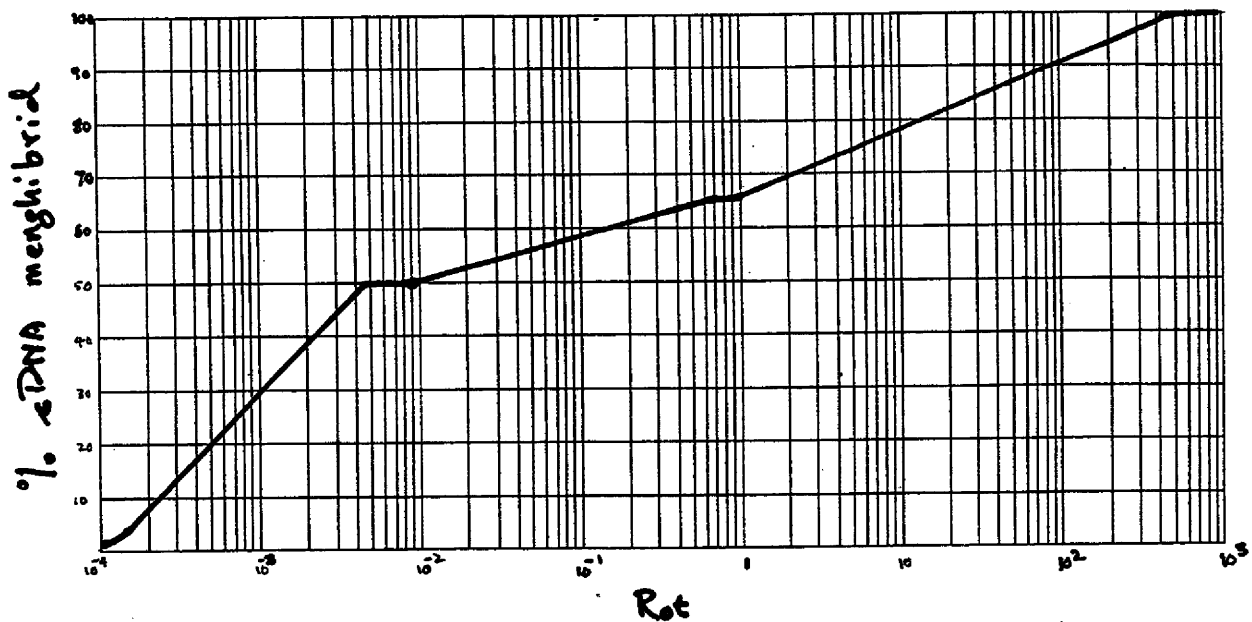
(5 markah)

2. The following is a reassociation kinetics of cDNA hybridizing to excess mRNA.



- (a) Identify the components reassociating in terms of range of R_0t and fraction of genome occupied. (5 marks)
- (b) What is the $R_0t_{1/2}$ (observed) and $R_0t_{1/2}$ (pure) for the components? (5 marks)
- (c) How many mRNA species are there in each component? (5 marks)
- (d) What is the abundance for each component? Assume a value of 0.275 pg mRNA per haploid cell. (5 marks)

2. Berikut adalah kinetik pesekutuan semula cDNA menghibrid kepada mRNA berlebihan.



(a) *Camkan komponen yang terlibat dari segi julat R_{ot} dan pecahan genom yang didudukinya.*

(5 markah)

(b) *Apakah $R_{ot\frac{1}{2}}$ (tercepat) dan $R_{ot\frac{1}{2}}$ (tulen) setiap komponen?*

(5 markah)

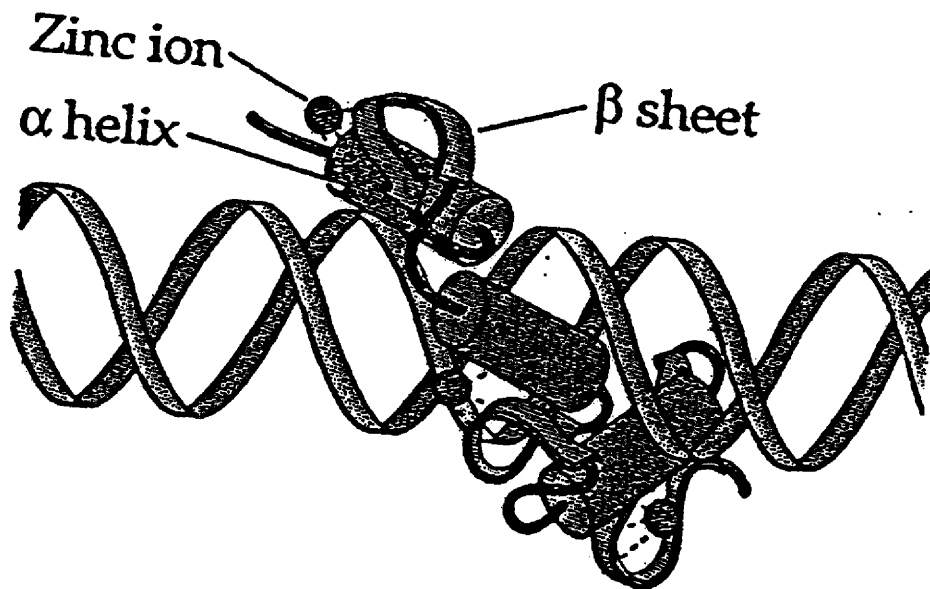
(c) *Berapakah bilangan spesies mRNA setiap komponen?*

(5 markah)

(d) *Apakah kelimpahan setiap komponen? Anggapkan nilai 0.275 pg mRNA per sel haploid.*

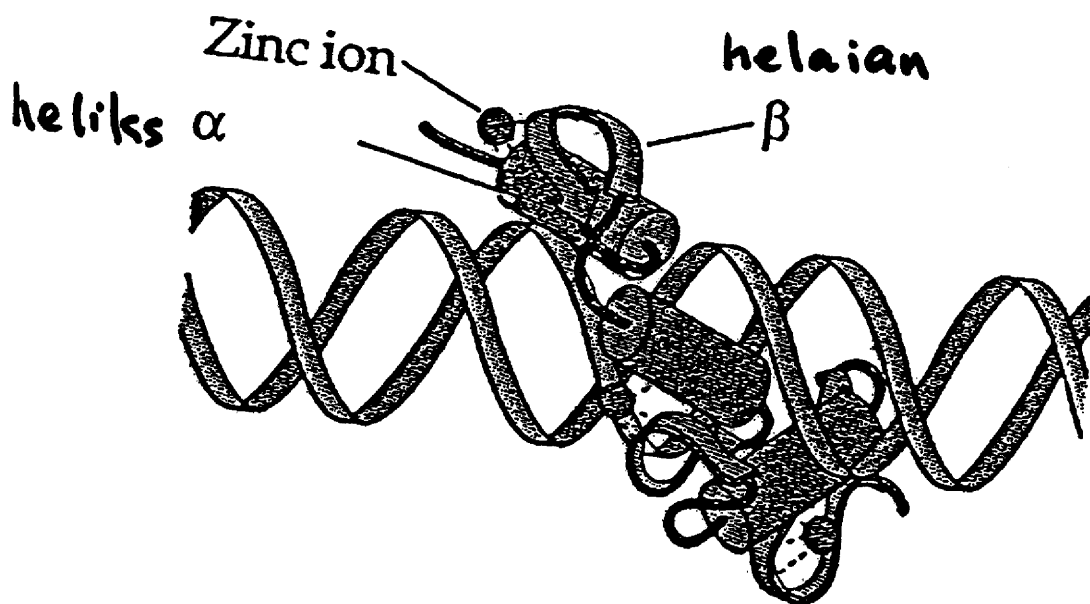
(5 markah)

3. The following diagram shows a protein binding to DNA.



- (a) Describe the nature (function) and type (conserved motifs) of protein involved. (5 marks)
- (b) Sketch and label the regions involved (projections) in binding to the major groove of DNA. (12 marks)
- (c) What type of amino acid side chains are bound to the phosphate backbone? (3 marks)

3. *Gambarajah berikut menunjukkan ikatan suatu protein kepada DNA.*



- (a) *Huraikan sifat (fungsi) dan jenis (motif terabdi) protein terlibat.*

(5 markah)

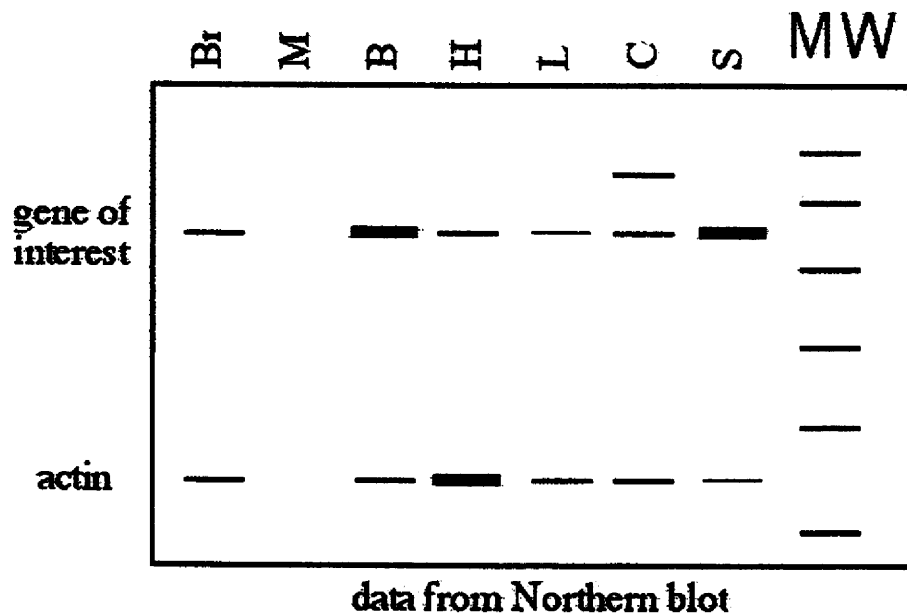
(b) *Lakar dan labelkan kawasan menonjol yang terikat pada lekuk major DNA.*

(12 markah)

(c) *Apakah jenis rantai sisi asid amino yang mengikat kepada tulang belakang fosfat?*

(3 markah)

4.



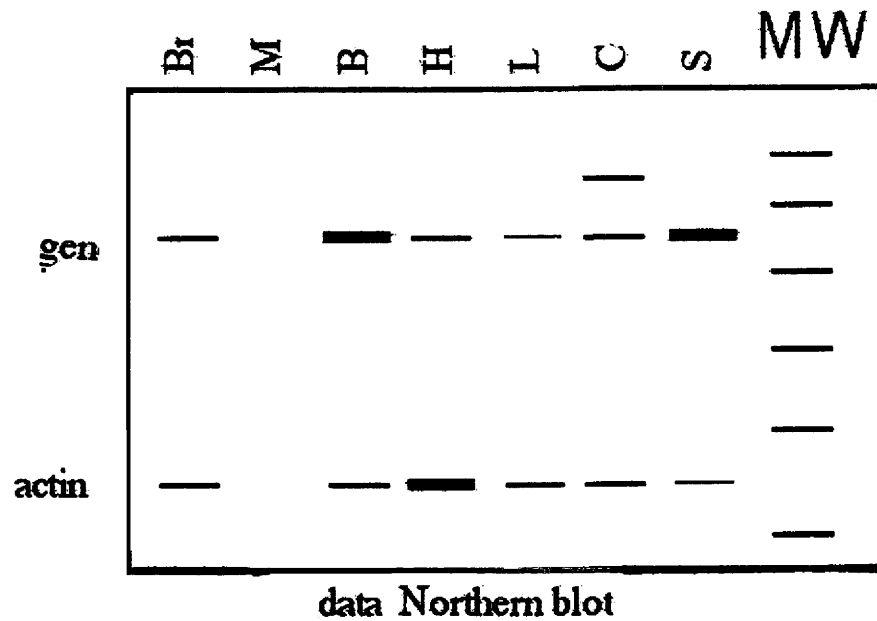
(a) Interpret completely the data from this Northern blot of the products of an inducible gene from the various plant tissues Br, M, B, H, L, C and S.

(15 markah)

(b) What is the role of 'actin' and the lane marked MW?

(5 markah)

4.



- (a) Tafsirkan dengan lengkap data blot Northern hasil sesuatu gen teraruh daripada tisu tumbuhan Br, M, B, H, L, C and S.
(15 markah)
- (b) Apakah peranan aktin dan lorong MW?
(5 markah)
5. (a) Describe with the aid of a schematic diagram the process of non-cyclic photophosphorylation taking into consideration the relative redox potential value of each component.
(15 marks)
- (b) What are the disadvantages of the result of photorespiration in plants?
(5 marks)

5. (a) *Huraikan dengan bantuan gambarajah skema proses fotofosforilasi bukan siklik dengan mengambilkira nilai relative keupayaan redoks setiap komponen.*

(15 markah)

- (b) *Apakah keburukan akibat proses fotorespirasi dalam tumbuhan?*

(5 markah)

6. (a) Explain the differentiation of proplastids and state the functions of each plastids.

(8 marks)

- (b) Explain one (1) of the followings:

(i) How cytochrome c_1 can be targeted into the mitochondrial intermembrane space.

(ii) How plastocyanin can be targeted into the thylakoid human.

(iii) How the integral membrane protein is inserted.

(12 marks)

6. (a) *Terangkan pembezaan proplastid dan nyatakan fungsi setiap plastid yang terlibat.*

(8 markah)

- (b) *Terangkan satu (1) daripada berikut:*

(i) *Bagaimana sitokrom disasarkan ke dalam ruang intermembran mitokondria.*

(ii) *Bagaimana plastosiamin disasarkan ke dalam lumen tilakoid.*

(iii) *Bagaimana protein membrane integral disisipkan.*

(12 markah)