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UNIVERSITI SAINS MALAYSIA

Second Semester Examination  
Academic Session 2007/2008

April 2008

**BBT 214/4 – Plant Biosystematics and Taxonomy**  
***[Taksonomi dan Biosistematik Tumbuhan]***

Duration: 3 hours  
*[Masa : 3 jam]*

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Please ensure that this examination paper contains SEVEN printed pages before you begin the examination.

*[Sila pastikan bahawa kertas peperiksaan ini mengandungi TUJUH muka surat yang bercetak sebelum anda memulakan peperiksaan ini.]*

**Instructions:** Answer **FIVE** (5) out of **SIX** (6) questions, in English or Bahasa Malaysia. Each question carries 20 marks.

***[Arahan:*** Jawab **LIMA** (5) daripada **ENAM** (6) soalan yang diberikan dalam Bahasa Inggeris atau Bahasa Malaysia. Tiap-tiap soalan bernilai 20 markah.]

1. You are required to make a documentation of all the plants species in Penang National Park. Discuss in detail the steps taken for documentation.

(20 marks)

2. What is the difference between:

[a] *Oncosperma horridum* and *Oncosperma tigillarum*.

(5 marks)

[b] Family Araceae and family Arecaceae (Palmae).

(5 marks)

[c] Monocotyledon and dicotyledon.

(5 marks)

[d] Inflorescence and infrutescence.

(5 marks)

3. [a] What is the status of the genus below:

[i] *Rafflesia*

[ii] *Cassytha*

[iii] *Loranthus*

[iv] *Asplenium*

[v] *Dendrobium*

[vi] *Pistia*

[vii] *Aglaonema*

[viii] *Garcinia*

[xi] *Calophyllum*

[x] *Shorea*

(10 marks)

[b] Based on 3 [a], construct a key to differentiate between [i] → [x].

(10 marks)

4. Table below shows the data obtained from a palynology analysis of six different taxa. List all the similarities that are shared by those taxa. Calculate the degree of resemblance between every pair of taxa. Subsequently, insert the data in similarity matrixes and construct a dendrogram.

Characters/species	<i>Centella asiatica</i>	<i>Eryngium foetidum</i>	<i>Apium graveolens</i>	<i>Daucus carota</i>	<i>Hydrocotyle rotundifolia</i>	<i>Oenanthe javanica</i>
Pollen grain per anther 0: 4 1: more than 4	0	1	1	0	0	0
Pollen type 0: calymmate 1: acalymmate	0	0	1	1	0	0
Non-equatorial apertures 0: porate 1: colpate	0	1	0	1	0	1
Equatorial apertures 0: absent 1: present	1	1	1	1	1	0
Costae 0: absent 1: present	1	1	0	0	0	1
Exine ornamentation 0: striate 1: reticulate	1	0	0	1	1	0
Perforated tectum 0: absent 1: present	1	1	0	1	0	1
Columellae 0: absent 1: present	1	0	1	0	0	0

(20 marks)

5. Interspecies relationships can be inferred from dendrograms generated from distance-based or character-based methods. Using suitable examples, describe these two methods and their advantages and disadvantages.

(20 marks)

6. [a] Explain homoplasy.

(4 marks)

- [b] What are monophyletic, paraphyletic and polyphyletic groups?

(6 marks)

- [c] Provide the definition of hybrid and criteria that can be applied to detect the occurrence of hybrid in a habitat.

(10 marks)

1. Anda dikehendaki mendokumentasi semua tumbuhan yang terdapat di Taman Negara Pulau Pinang. Bincangkan secara mendalam langkah yang perlu untuk dokumentasi.

(20 markah)
  
2. Apakah perbezaan di antara:
  - [a] *Oncosperma horridum* dan *Oncosperma tigillarum*.

(5 markah)
  - [b] Famili Araceae dan famili Areaceae (Palmae).

(5 markah)
  - [c] Monokotiledon dan dikotiledon.

(5 markah)
  - [d] Infloresen dan infrutesen.

(5 markah)
  
3. [a] Apakah status genus berikut:
  - [i] *Rafflesia*
  - [ii] *Cassytha*
  - [iii] *Loranthus*
  - [iv] *Asplenium*
  - [v] *Dendrobium*
  - [vi] *Pistia*
  - [vii] *Aglaonema*
  - [viii] *Garcinia*
  - [xi] *Calophyllum*
  - [x] *Shorea*

(10 markah)

- [b] Berdasarkan 3 [a], bentukkan satu kekunci untuk membezakan [i] → [x].

(10 markah)

4. Jadual di bawah menunjukkan data yang diperolehi daripada satu analisis palinologi bagi enam taksa yang berlainan. Senaraikan semua persamaan yang dikongsi oleh taksa ini. Kira darjah kesamaan antara setiap pasangan taksa. Kemudian masukkan data dalam matriks persamaan dan binakan dendogram.

Ciri/spesies	<i>Centella asiatica</i>	<i>Eryngium foetidum</i>	<i>Apium graveolens</i>	<i>Daucus carota</i>	<i>Hydrocotyle rotundifolia</i>	<i>Oenanthe javanica</i>
Butir debunga per anter 0: 4 1: lebih daripada 4	0	1	1	0	0	0
Jenis debunga 0: kalimat 1: akalimat	0	0	1	1	0	0
Apertur tak-khatulistiwa 0: berliang 1: kolpat	0	1	0	1	0	1
Apertur khatulistiwa 0: tidak hadir 1: hadir	1	1	1	1	1	0
Kostae 0: tidak hadir 1: hadir	1	1	0	0	0	1
Ornamentasi eksin 0: berstria 1: retikulat	1	0	0	1	1	0
Tektum tertebuk 0: tidak hadir 1: hadir	1	1	0	1	0	1
Kolumela 0: tidak hadir 1: hadir	1	0	1	0	0	0

(20 markah)

5. Perhubungan interspesies boleh ditunjukkan melalui dendogram yang dijana dengan kaedah berdasarkan-jarak atau kaedah berdasarkan-ciri. Dengan menggunakan contoh yang sesuai huraikan kedua-dua kaedah ini serta kelebihan dan kekurangannya.

(20 markah)

6. [a] Terangkan maksud homoplasi.

(4 markah)

- [b] Apakah kumpulan monofiletik, parafiletik dan polifiletik?

(6 markah)

- [c] Berikan takrifan bagi hibrid dan kriteria yang dapat digunakan untuk mengesan kehadiran hibrid dalam sesuatu habitat.

(10 markah)