



Second Semester Examination
2024/2025 Academic Session

July/August 2025

BST223 – Population and Community Ecology
[Ekologi Populasi dan Komuniti]

Duration: 2 hours
[Masa: 2 jam]

Please ensure that this examination paper contains FIVE (5) printed pages before you begin the examination.

[Sila pastikan bahawa kertas peperiksaan ini mengandungi LIMA (5) muka surat yang bercetak sebelum anda memulakan peperiksaan ini.]

Instructions: Answer **FOUR (4)** out of **FIVE (5)** questions, in English or Bahasa Malaysia. Each question carries 25 marks.

[Arahan: Jawab **EMPAT (4)** daripada **LIMA (5)** soalan yang diberikan dalam Bahasa Inggeris atau Bahasa Malaysia. Tiap-tiap soalan bernilai 25 markah.]

In the event of any discrepancies, the English version shall be used.

[Sekiranya terdapat sebarang percanggahan pada soalan peperiksaan, versi Bahasa Inggeris hendaklah diguna pakai.]

Should any candidate be caught cheating or in possession of materials not authorised to be brought into the Examination Hall during the examination, appropriate disciplinary action will be taken against the candidate concerned. In the event a candidate is found guilty of cheating, he/she can be expelled from the University.

[Sekiranya seseorang calon didapati meniru/menipu ataupun mempunyai bahan-bahan yang tidak dibenarkan dibawa ke dalam Dewan Peperiksaan semasa peperiksaan diadakan, tindakan disiplin yang sewajarnya akan dikenakan terhadap calon berkenaan. Jika seseorang calon didapati bersalah meniru/menipu beliau boleh disingkir dari Universiti.]

1. [a] Describe the differences among a true census, a sampling estimate, and an index method used in estimating animal populations. Provide **ONE (1)** example for each method to support your explanation.
*[Huraikan perbezaan antara bancian sebenar, anggaran persampelan, dan kaedah indeks yang digunakan dalam menganggar populasi haiwan. Berikan **SATU (1)** contoh bagi setiap kaedah untuk menyokong penjelasan anda.]*

(10 marks / 10 markah)

- [b] A conservationist needs to calculate a sample population of frogs in a fragmented wetland area, which is characterised by limited access points, moderate vegetation cover, and seasonal changes in water level. Analyse the suitability of the two different population calculation techniques under these environmental constraints. Support your analysis by providing relevant formulas, strengths and limitations of each method, and a recommendation for the most appropriate technique for this ecological context.
[Seorang ahli konservasi perlu mengira populasi sampel katak di kawasan tanah lembap yang terfragmen, yang dicirikan oleh akses terhad ke lokasi, litupan vegetasi yang sederhana, dan perubahan aras air mengikut musim.
Berikan analisis kesesuaian dua teknik pengiraan populasi yang berbeza di bawah kekangan alam sekitar ini. Sokong analisis anda dengan menyediakan formula yang berkaitan, kekuatan dan batasan bagi setiap kaedah, dan cadangan untuk teknik yang paling sesuai untuk konteks ekologi ini.]

(15 marks / 15 markah)

2. [a] Explain the contribution of camera trap data in enhancing our understanding of animal behaviour and spatial information in tropical forest environments. Provide one specific example each for behavioural data and spatial information that can be derived from such studies.
[Terangkan sumbangan data perangkap kamera dalam meningkatkan pemahaman kita tentang tingkah laku haiwan dan maklumat spatial dalam persekitaran hutan tropika. Sediakan satu contoh khusus setiap satu untuk data tingkah laku dan maklumat spatial yang boleh diperolehi daripada kajian tersebut.]

(10 marks / 10 markah)

- [b] Analyse the influence of spatial sampling design of camera trap surveys on detection rates, species coverage, and data interpretation in tropical forest ecosystems. Include two potential advantages and two limitations of this approach.

[Berikan analisis pengaruh reka bentuk persampelan spatial tinjauan perangkap kamera terhadap kadar pengesanan, liputan spesies, dan tafsiran data dalam ekosistem hutan tropika. Sertakan dua potensi kelebihan dan dua batasan pendekatan ini.]

(15 marks / 15 markah)

3. [a] Explain the main biotic and abiotic factors that regulate tree population dynamics in tropical forests.

[Terangkan faktor utama biotik dan abiotik yang mengawal kedinamikan populasi pokok di hutan tropika.]

(10 marks / 10 markah)

- [b] Analyse the influence of interspecific interactions on the structure of tropical forest communities.

[Berikan analisis pengaruh interaksi interspesifik terhadap struktur komuniti hutan tropika.]

(15 marks / 15 markah)

4. [a] Discuss the process of ecological succession in a tropical rainforest following a disturbance.

[Bincangkan proses sesaran ekologi dalam hutan hujan tropika selepas gangguan.]

(10 marks / 10 markah)

- [b] Characterise the types of relative species abundance patterns with the help of a rank-abundance diagram.

[Cirikan jenis corak kelimpahan spesies relatif dengan bantuan gambar rajah pangkat-kelimpahan.]

(15 marks / 15 markah)

5. [a] The distribution of Longjack (*Eurycoma longifolia*) plants in a forest reserve is shown in Table 1:
 [Taburan pokok Tongkat Ali (*Eurycoma longifolia*) di hutan simpan ditunjukkan dalam Jadual 1:]

Table 1
 [Jadual 1]

Quadrat [Kuadrat]	Observation (number of individuals recorded) [Pemerhatian (bilangan individu direkodkan)]
J	5
K	5
L	6
M	1
N	1
O	4
P	3

Based on the result in Table 1, classify the distribution pattern of Longjack based on its variance-to-mean relationship. Conduct the calculation to 3 decimal places.

[Berdasarkan Keputusan dalam Jadual 1, klasifikasikan corak taburan Tongkat Ali berdasarkan hubungan varians-ke-minnya. Lakukan pengiraan hingga 3 tempat perpuluhan.]

(10 marks / 10 markah)

- [b] Using the data in Table 2, determine the Shannon's Diversity Index and the Menhinick Species Richness Index of fishes in Lake Alpha and Lake Beta. Conduct the calculation to 3 decimal places. Based on the results, which lake has the highest diversity and the highest richness?

[Dengan menggunakan data dalam Jadual 2, tentukan Indeks Kepelbagaian Shannon dan Indeks Kekayaan Spesies Menhinick bagi ikan di Tasik Alpha dan Tasik Beta. Lakukan pengiraan hingga 3 tempat perpuluhan. Berdasarkan keputusan, tasik manakah yang mempunyai kepelbagaian tertinggi dan kekayaan tertinggi?]

Table 2: Fish species and abundance in [i] Lake Alpha and [ii] Lake Beta
[Jadual 2: Spesies ikan dan kelimpahan di [i] Tasik Alfa dan [ii] Tasik Beta]

[i]

Lake Alpha / Tasik Alfa	
Fish species [Spesies Ikan]	Number of individuals [Bilangan individu]
A	2
B	8
C	34
D	274
E	9
F	22
G	70

[ii]

Lake Beta / Tasik Beta	
Fish species [Spesies Ikan]	Number of individuals [Bilangan individu]
P	8
Q	7
R	9
S	6
T	8
U	7
V	5

(15 marks / 15 markah)