
UNIVERSITI SAINS MALAYSIA

Supplementary Semester Examinations
Academic Session 2003/2004

*Peperiksaan Semasa Cuti Panjang
Sidang Akademik 2003/2004*

April 2004

BST 203E/3 - Population Ecology & Community
BST 203E/3 - Ekologi Populasi & Komuniti

Masa : [3 jam]

Please ensure that this examination paper contains SIX printed pages.

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

Each question carries 20 marks.

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

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

Tiap-tiap soalan bernilai 20 markah.

1. Table shows an example of a life table. The data in the x and L_x columns were obtained from a population of wild otter. Then, all other columns of data could be derived from them.

Age (yr)	Cohort (age interval) x	Number in Cohort, L_x	Number Living at Start, l_x	Number Dying during x , d_x	Probability of Dying during x , q_x	Probability of Surviving Interval x , s_x	Animal-Years Live, T_x	Live to Expectancy, e_x (yr)
0-1	0	33						
1-2	1	16						
2-3	2	9						
3-4	3	4						
4-5	4	1						
5-6	5	0						

Complete the life table by filling all the values of columns l_x , d_x , q_x , s_x , T_x and e_x .

(20 marks)

1. Jadual di bawah menunjukkan satu jadual hidup. Data-data di dalam kolom x dan L_x dicerap daripada satu populasi memerang liar. Kemudian data untuk kesemua kolom berikutnya boleh dikira daripada kolom sebelumnya.

Age (yr)	Kohort (sela umur) x	Bilangan dalam Kohort, L_x	Bilangan hidup pada permulaan sela, l_x	Bilangan mati semasa x , d_x	Kebarang-kalian mati semasa x , q_x	Kebarang-kalian mandiri pada sela x , s_x	Tahun-untuk masih hidup haiwan, T_x	Kejang-kaan hidup, e_x (yr)
0-1	0	33						
1-2	1	16						
2-3	2	9						
3-4	3	4						
4-5	4	1						
5-6	5	0						

Lengkapkan jadual hidup tersebut dengan mengisi nilai-nilai untuk kolom-kolom l_x , d_x , q_x , s_x , T_x and e_x .

(20 markah)

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2. Discuss the approach of mark-recapture method in estimating animal population numbers in details. Examples and specific formula must be included.

(20 marks)

2. Secara lengkap, bincangkan pendekatan kaedah tangkap-tanda-lepas semula dalam menganggar saiz populasi haiwan. Berikan contoh-contoh dan formula yang digunakan.

(20 markah)

3. Based on distribution models, explain the terms geometric, broken-stick and lognormal distributions; with the help of diagrams.

(20 marks)

3. Berdasarkan model-model taburan, jelaskan maksud taburan geometric, kayu-patah dan lognormal; dengan pertolongan gambarajah.

(20 markah)

4. Ecologists have developed various indices that measure the degree of species overlap in an attempt to gain insight into community structure. Hypothetical data showing four resources states as prey for three predator species.

		Resource states			
Prey order	(1)	(2)	(3)	(4)	
Relative availability of resources	0.4	0.4	0.1	0.1	

	Species				
Relative utilization by predators	1	2	3	4	5
	0.25	0.25	0.25	0.25	0.25
	0.50	0.50	0.0	0.0	0.0
	0.0	0.0	0.50	0.50	0.50

- (i) The value of Levins index for overlap (LO_{12}) of species 1 with species 2.
(ii) The value of Levins index for overlap (LO_{21}) of species 2 with species 1.

Explain the process involved.

(20 marks)

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4. Ahli ekologi telah membentuk beberapa indeks untuk mengukur darjah pertindihan spesies di dalam percubaan untuk mendapatkan pandangan tentang struktur komuniti. Data hipotetikal menunjukkan keadaan empat sumber sebagai mangsa untuk tiga spesies pemangsa.

Mangsa	Sumber			
	(1)	(2)	(3)	(4)
Kehadiran sumber secara relatif	0.4	0.4	0.1	0.1

Kegunaan spesies pemangsa secara relatif	Spesies			
	1	2	3	4
1	0.25	0.25	0.25	0.25
2	0.50	0.50	0.0	0.0
3	0.0	0.0	0.50	0.50

- (i) Nilai indeks Levins untuk pertindihan (LO_{12}) spesies 1 dengan spesies 2.
- (ii) Nilai indeks Levins untuk pertindihan (LO_{21}) spesies 2 dengan spesies 1.
Jelaskan proses yang terlibat.

(20 markah)

5. Discuss the effects of predation on prey fitness.

(20 markah)

5. Bincangkan kesan pemangsaan terhadap ketegapan mangsa.

(20 markah)

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6. The following is the abundance of 11 phytoplankton species (species A – K) at 5 locations:

	Locations				
	<i>Lokasi</i>				
Species	a	b	c	d	e
Spesies					
A	4	3	2	2	0
B	64	54	57	51	0
C	2	0	0	6	0
D	66	81	83	196	108
E	24	40	44	31	0
F	3	2	3	1	0
G	20	2	4	3	1
H	3	20	11	30	18
I	18	4	5	4	0
J	45	5	10	10	0
K	3	1	0	0	0

Determine the distance between two communities based on Euclidean Distance Index.

(20 marks)

6. Berikut adalah kelimpahan 11 species fitoplankton (species A – K) di 5 lokasi:

	Locations				
	Lokasi				
Species	a	b	c	d	e
A	4	3	2	2	0
B	64	54	57	51	0
C	2	0	0	6	0
D	66	81	83	196	108
E	24	40	44	31	0
F	3	2	3	1	0
G	20	2	4	3	1
H	3	20	11	30	18
I	18	4	5	4	0
J	45	5	10	10	0
K	3	1	0	0	0

Tentukan jarak antara dua komunitas berdasarkan Indeks Jarak Euclidean.

(20 markah)