



Second Semester Examination  
2022/2023 Academic Session

July/August 2023

**BAT305 – Benthic Biology And Ecology**  
***(Biologi Dan Ekologi Benthik)***

Duration : 2 hours  
(Masa : 2 jam)

Please check that this examination paper consists of FIVE (5) pages of printed material 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)** questions. **Section A is COMPULSORY.** Answer **THREE (3) questions from Section B.** Each question carries 25 marks.

**[Arahan:** Jawab **EMPAT (4)** soalan. **Bahagian A WAJIB dijawab.** Jawab **TIGA (3) soalan daripada Bahagian B.** *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 digunapakai.]*

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## SECTION A : (Compulsory)

**[BAHAGIAN A: (Wajib)]**

1. Figure 1 shows the abundance of mangrove crabs and polychaetes sampled from two mangrove forests, Matang in Taiping and Balik Pulau in Penang. The Matang mangrove is a less disturbed, managed forest while the Balik Pulau mangrove was characterized by deforested patches and close proximity to aquaculture ponds.

*[Rajah 1 menunjukkan kelimpahan ketam bakau dan polikaet yang disampel dari dua hutan bakau, iaitu Matang di Taiping dan Balik Pulau di Pulau Pinang. Hutan bakau Matang adalah hutan yang kurang terganggu dan terurus manakala hutan bakau Balik Pulau dicirikan oleh kawasan hutan yang ditebang dan dekat dengan kolam akuakultur.]*

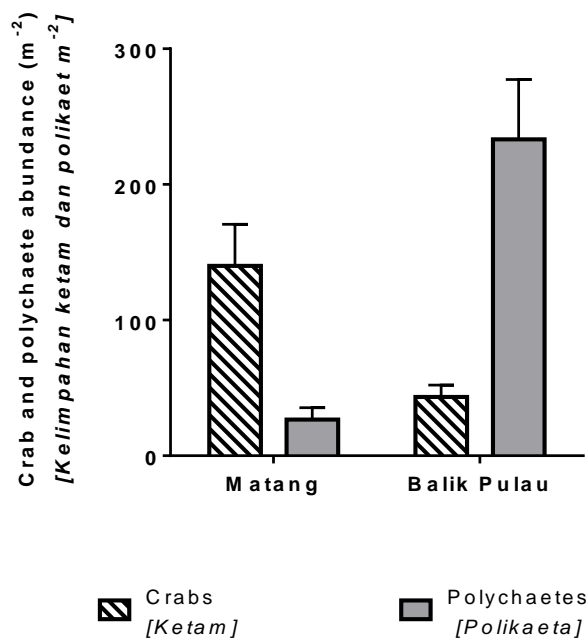


Figure 1  
*[Rajah 1]*

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Table 1: Data for habitat variables were recorded as follows:

[Jadual 1: Data pembolehubah habitat direkodkan seperti berikut:]

Habitat variables [Pembolehubah habitat]	Matang	Balik Pulau
Mangrove root density (pneumatophore/m <sup>2</sup> ) [Kepadatan akar bakau (pneumatofor/m <sup>2</sup> )]	500	200
Sediment surface temperature (°C) [Suhu permukaan sedimen (°C)]	28	30
Canopy cover (%) [Litupan kanopi %]	65	20
Organic matter (%) [Bahan organik (%)]	60	80
Deforested patches (%) [Kawasan hutan ditebang %]	30	45

Analyse the given data and provide the reasons explaining the observed patterns for (i) benthic macrofauna, (ii) habitat and (iii) benthic fauna-habitat relationships.

[Berikan analisis data tersebut dan berikan sebab yang menerangkan corak (i) fauna, (ii) persekitaran dan (iii) hubungan fauna-alam sekitar.]

(25 marks / 25 markah)

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**SECTION B: Answer THREE (3) questions**

**[BAHAGIAN B: Jawab TIGA (3) soalan]**

2. [a] Discuss the ecological and economical significance of the biomodification process in Figure 2.  
*[Bincangkan kepentingan ekologi dan ekonomi untuk proses biomodifikasi dalam Rajah 2.]*

(15 marks / 15 markah)

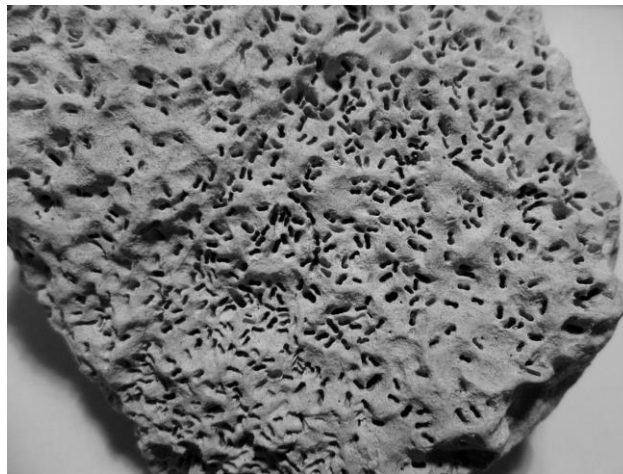


Figure 2  
*[Rajah 2]*

- [b] Categorize the correct suspension feeding modes based on the current velocities in Table 2. The slow to high velocities ranged from a minimum of 0.8 cm/second to a maximum of 5 cm/second.  
*[Kategorikan mod suapan ampaian yang betul berdasarkan halaju semasa dalam Jadual 2. Halaju perlahan hingga tinggi berjalat dari minimum 0.8 sm/saat hingga maksimum 5 sm/saat.]*

Site	A	B	C
Current velocity (cm/second)	0.8 (Constant low velocity)	0.8: First tidal cycle  3.5: Second tidal cycle (Low velocity and high velocity)	5 (Constant high velocity)

(10 marks / 10 markah)

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3. Discuss the adaptations of benthic fauna to fluctuating temperatures in the intertidal region.

*[Bincangkan penyesuaian fauna bentik terhadap perubahan suhu di kawasan pasang surut.]*

(25 marks / 25 markah)

4. Compare the advantages and disadvantages of using meiofauna for environmental monitoring.

*[Bandingkan kelebihan dan kekurangan menggunakan meiofauna bagi pemantauan alam sekitar.]*

(25 marks / 25 markah)

5. Describe indicators of sediment quality that can be assessed using meiofauna and provide an example of how meiofauna can be used to identify pollution hotspots in a specific ecosystem.

*[Huraikan penunjuk kualiti sedimen yang boleh dinilai menggunakan meiofauna dan berikan contoh bagaimana meiofauna boleh digunakan untuk mengenal pasti titik panas pencemaran dalam ekosistem tertentu.]*

(25 marks / 25 markah)

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