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**UNIVERSITI SAINS MALAYSIA**

Second Semester Examination  
Academic Session 2008/2009

April/Mei 2009

**BMT 205/3 - Immunology**  
**[Imunologi]**

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.]

...2/-

1. Innate or non-specific immune responses act as the first line of defense against invading microbes.

[a] Explain granulocytes and their importance as defensive cells.

(7 marks)

[b] Discuss the process of phagocytosis in cellular defense.

(7 marks)

[c] Discuss extracellular killing in dealing with worm and virus infections.

(6 marks)

2. Descript the following:

[a] Acute inflammation process.

(8 marks)

[b] Complement system.

(12 marks)

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3. [a] Explain the mechanisms of antibody actions in combating invading microbes.

(6 marks)

- [b] TABLE 1 shows information about immunoglobulin (Ig) genes.

Table 1

Gene family	Gene segment
Light chain kappa ( $\kappa$ )	4J and 4V
Light chain lambda ( $\lambda$ )	4J and 6V
Heavy chain	3D, 6J and 8V

- [i] With the aid of a suitable diagram, explain how IgG consisting of light chain  $J_{\lambda 2}$  and  $V_{\lambda 3}$  and heavy chain  $D_{H3}$ ,  $J_{H5}$  and  $V_{H7}$  is formed, using the mechanism of gene rearrangement.

(10 marks)

- [ii] Calculate the maximum number of Ig that can be produced by the mechanism of gene rearrangement.

(4 marks)

4. Discuss the involvement of humoral and cellular immunity as an integrated system in response to invading microbes.

(20 marks)

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5. [a] Differentiate between antigen and immunogen. (2 marks)
- [b] Discuss the requirements of a good immunogen. (8 marks)
- [c] Compare and contrast between epitope recognition in T cells and B cells. (10 marks)
6. Write an essay about the different types of hypersensitivity. (20 marks)

1. Tindak balas keimunan sejati atau bukan spesifik berperanan sebagai barisan pertahanan pertama menentang pencerobohan mikrob.
  - [a] Jelaskan berkenaan granulosit dan kepentingannya sebagai sel bertahan.

(7 markah)
  - [b] Bincangkan proses fagositosis dalam sel pertahanan.

(7 markah)
  - [c] Bincangkan pembunuhan ekstrasel dalam menghadapi jangkitan cacing dan virus.

(6 markah)
  
2. Terangkan yang berikut:
  - [a] Proses keradangan akut.

(8 markah)
  - [b] Sistem komplemen.

(12 markah)

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3. [a] Jelaskan mekanisme tindakan antibodi dalam melawan pencerobohan mikrob.

(6 markah)

- [b] JADUAL 1 menunjukkan maklumat berkenaan gen immunoglobulin (Ig).

Jadual 1

Famili gen	Segmen gen
Rantai ringan kappa ( $\kappa$ )	4J and 4V
Rantai ringan lamda ( $\lambda$ )	4J and 6V
Rantai berat	3D, 6J and 8V

- [i] Dengan bantuan gambarajah yang sesuai, terangkan bagaimana IgG yang terdiri daripada rantai ringan  $J_{\lambda 2}$  dan  $V_{\lambda 3}$  dan rantai berat  $D_{H3}$ ,  $J_{H5}$  dan  $V_{H7}$  terbentuk melalui mekanisme penyusunan semula gen.

(10 markah)

- [ii] Kira bilangan maksimum Ig yang boleh dihasilkan melalui mekanisme penyusunan semula gen.

(4 markah)

4. Bincangkan penglibatan keimunan humoral dan keimunan sel sebagai satu sistem intergrasi dalam tindak balas terhadap pencerobohan mikro.

(20 markah)

5. [a] Bezakan di antara antigen dan imunogen.  
(2 markah)
- [b] Bincangkan syarat-syarat imunogen yang baik.  
(8 markah)
- [c] Bandingkan dan bezakan di antara pengenalan epitop oleh sel T dan sel B.  
(10 markah)
6. Tuliskan satu esei berkenaan jenis-jenis kehiperpekaan yang berbeza.  
(20 markah)

