UNIVERSITI SAINS MALAYSIA

Second Semester Examination
Academic Session 2009/2010

April/May 2010

IMG 222 – Food Microbiology II
[Mikrobiologi Makanan II]

Duration: 3 hours
[Masa: 3 jam]

Please check that this examination paper consists of NINE pages of printed material before you begin the examination.

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

Instructions: Answer any **FIVE (5)** out of eight questions. Answer **FOUR** questions from SECTION A and **ONE** question from SECTION B. Answer questions from SECTION A and SECTION B in separate Answer Books. You may answer the question either in Bahasa Malaysia or in English.

*[**Arahan**: Jawab mana-mana **LIMA (5)** daripada lapan soalan. Jawab **EMPAT** soalan daripada BAHAGIAN A dan **SATU** soalan daripada BAHAGIAN B. Jawab soalan daripada BAHAGIAN A dan BAHAGIAN B dalam Buku Jawapan berasingan. Anda dibenarkan menjawab soalan sama ada [untuk KBI] dalam Bahasa Malaysia atau Bahasa Inggeris.]*

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].

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SECTION A. Answer any **FOUR** question on separate Answer Books.

1. Answer all parts of this question.

   (a) With an aid of flowchart, list the various stages involved in poultry processing.

   (5 marks)

   (b) Identify and explain the stages at which microbial contamination will be increased or decreased.

   (10 marks)

   (c) Name the common spoilage organisms of poultry stored at chill temperature.

   (5 marks)

2. Answer all parts of this question.

   (a) Identify and explain the important intrinsic factors that influence the microbiology and spoilage of fish.

   (15 marks)

   (b) Explain briefly, the role of *Shewanella putrefaciens* , Pseudomonas spp. and *Photobacterium phosphoreum* in the spoilage of fish.

   (5 marks)

3. Answer all parts of this question.

   (a) List the components of microbiological criteria.

   (5 marks)

   (b) Describe the benefits and application of microbiological criteria.

   (5 marks)

   (c) Discuss the 2 and 3- class sampling plans.

   (10 marks)

4. Answer all parts of this question.

   (a) Explain food infection, food toxico-infection and food intoxication.

   (5 marks)

   (b) Discuss the factors contributing to the increase in the incidence of foodborne infections and intoxications.

   (15 marks)

5. (a) Explain why during canning of high acid foods, the processing temperature used is much lower than the canning of low acid foods.

   (5 marks)

   (b) List the group of spoilage organisms and manifestations of spoiled low and high acid canned foods.

   (15 marks)

6. Discuss briefly, food poisoning caused by *Staphylococcus aureus* and *Clostridium botulinum*. In your answer, highlight the characteristics of the organisms, habitat, symptoms and causes of the symptoms, mode of transmission and food implicated.

   (20 marks)

SECTION B. Answer only **ONE** question on a separate Answer Book.

7. Answer all parts of this question.

Food products such as pepper, coffee beans and groundnuts have been imported into Malaysia. However, it is suspected that these products might be contaminated by various bacteria and pathogenic moulds. As a microbiologist, write briefly, how would you analyze these samples for:

(a) The presence of *E. coli* and *coliform.*

(10 marks)

(b) Describe in detail the procedure for the determination and enumeration of yeast and fungi. How would you calculate for the percentage incidence of fungi?

(10 marks)

8. Answer all parts of this question.

(a) 25 g of food samples A, B, C and D were tested in a Food Microbiology laboratory for the presence of aerobic plate counts (APC). The colony counts and their respective dilutions are stated in the Table below. Based on the results provided in the table, calculate and report the plate counts for each individual samples.

(10 marks)

Samples	**Dilution factor**	**Number of colonies**	**APC**
A	10^{-1}	140, 150	
	10^{-2}	110, 130	
	10^{-3}	10, 20	
B	10^{-1}	400, 450	
	10^{-2}	350, 300	
	10^{-3}	20, 30	
C	10^{-1}	TNTC, TNTC*	
	10^{-2}	600, 650	
D	10^{-1}	10, 20	
	10^{-2}	0,0	
	10^{-3}	0,0	

* TNTC: Too numerous to count

(b) Uncooked and cooked poultry samples were analyzed for aerobic plate count. The counts are given in the table below.

APC of uncooked poultry		**APC of cooked poultry**	
Dilution	**Colonies/plate**	**Dilution**	**Colonies/plate**
10^{-1}	130,140,145	10^{-1}	25,25,18
10^{-2}	120,110,80	10^{-2}	5,6,8
10^{-3}	10,14,15	10^{-3}	2,1,3

(i) Based on the above results, calculate the aerobic plate counts.
(ii) Briefly, write on the significance of the obtained results.

(10 marks)

BAHAGIAN A. *Jawab* ***EMPAT*** *soalan dalam Buku Jawapan berasingan.*

1. Jawab semua soalan bahagian ini.

(a) Dengan bantuan carta alir, senaraikan pelbagai peringkat dalam pemprosesan ayam.

(5 markah)

(b) Kenalpasti dan jelaskan peringkat yang mana pencemaran mikrob perosak boleh meningkat atau berkurang.

(10 markah)

(c) Namakan mikroorganisma perosak pada ayam yang disimpan pada suhu sejuk.

(5 markah)

2. Jawab semua soalan bahagian ini.

(a) Kenalpasti dan jelaskan faktor-faktor intrinsik penting yang mempengaruhi mikrobiologi dan kerosakan ikan.

(15 markah)

(b) Secara ringkas, jelaskan peranan Shewanella putrefaciens , Pseudomonas spp. dan Photobacterium phosphoreum dalam kerosakan ikan.

(5 markah)

3. Jawab semua soalan bahagian ini.

(a) Senaraikan komponen kriteria mikrob.

(5 markah)

(b) Huraikan kebaikan dan applikasi kriteria mikrob.

(5 markah)

(c) Bincangkan pelan pensampelan kelas 2 dan 3.

(10 markah)

4. Jawab semua soalan bahagian ini.

(a) Jelaskan infeksi makanan, toksiko-infeksi makanan dan intoxikasi makanan.

(5 markah)

(b) Bincangkan faktor-faktor yang menyumbang kepada peningkatan insiden keracunan dan intoksikasi makanan.

(15 markah)

5. (a) Terangkan mengapa semasa pengalengan makanan berasid tinggi suhu pemprosesan adalah lebih rendah berbanding dengan suhu pemprosesan makanan berasid rendah.

(5 markah)

(b) Senaraikan kumpulan mikroorganisma perosak serta manifestasi kerosakan makanan terkaleng berasid rendah dan tinggi.

(15 markah)

6. Secara ringkas bincangkan keracunan makanan yang disebabkan oleh 'Staphylococcus aureus' dan 'Clostridium botulinum'. Dalam jawapan kamu, beri tumpuan kepada sifat organisma, habitat, simptom dan penyebab simptom, mod transmisi dan makanan yang terlibat.

(20 markah)

BAHAGIAN B. *Jawab **SATU** soalan dalam Buku Jawapan berasingan.*

7. Jawab semua soalan bahagian ini.

Produk makanan seperti lada, kopi dan kacang tanah telah diimport ke Malaysia. Bagaimanapun, terdapat kecurigaan bahawa produk tersebut mungkin telah terkontaminasi oleh pelbagai bakteria dan kulat patogen. Sebagai seorang pakar mikrobiologi, sacara ringkas tulislah bagaimana cara anda menganalisis sampel tersebut untuk:

(a) Kehadiran E. coli dan coliform.

(10 markah)

(b) Huraikan secara rinci prosedur untuk menentukan dan mengenumerasi yis dan fungus. Bagaimana caranya anda menghitung peratus insiden fungus?

(10 markah)

8. Jawab semua soalan bahagian ini.

(a) Sebanyak 25 g sampel makanan A, B, C dan D telah diuji di makmal mikrobiologi makanan untuk kehadiran aerobic plate count (APC). Pengiraan koloni dan pencairan yang digunakan dinyatakan dalam jadual di bawah ini. Berdasarkan hasil yang didapatkan dalam jadual.

(10 markah)

Sampel	***Faktor Pencairan***	***Jumlah Koloni***	***APC***
A	10^{-1}	*140, 150*	
	10^{-2}	*110, 130*	
	10^{-3}	*10, 20*	
B	10^{-1}	*400, 450*	
	10^{-2}	*350, 300*	
	10^{-3}	*20, 30*	
C	10^{-1}	*TNTC, TNTC**	
	10^{-2}	*600, 650*	
D	10^{-1}	*10,20*	
	10^{-2}	*0,0*	
	10^{-3}	*0,0*	

**TNTC: Bilangan terlalu tinggi untuk dikira.*

(b) Telah dilakukan analisis APC untuk sampel ayam itik mentah dan telah dimasak. Hasil pengiraan diberikan dalam jadual dibawah:

APC ayam itik mentah		***APC ayam itik telah dimasak***	
Pencairan	***Koloni/cawan***	***Pencairan***	***Koloni/cawan***
10^{-1}	*130,140,145*	10^{-1}	*25,25,18*
10^{-2}	*120,110,80*	10^{-2}	*5,6,8*
10^{-3}	*10,14,15*	10^{-3}	*2,1,3*

(i) Berdasarkan hasil diatas, hitunglah nilai APC

(ii) Secara ringkas, tuliskan hasil penting yang didapatkan.

(10 markah)

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