UNIVERSITI SAINS MALAYSIA

Kursus Semasa Cuti Panjang
Academic Session 2007/2008

Jun 2008

BMT 203/3 – Microbial Genetics
[Genetik Mikrob]

Duration: 3 hours
[Masa : 3 jam]

Please ensure that this examination paper contains EIGHT printed pages before you begin the examination.

[Sila pastikan bahawa kertas peperiksaan ini mengandungi LAPAN 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.]*

1. Explain the function of the following and the effect if they are mutated:

   [a] *Chi* sequence

   [b] *recBCD*

   [c] *ruvA*

   [d] *polA*

   [e] *dnaG*

   (20 marks)

2. Explain the mechanism of the following DNA repair systems:

   [a] Mismatch repair

   [b] Nucleotide excision repair

   [c] Recombinational repair

   [d] "SOS" system

   (20 marks)

3. [a] The following is the leader peptide sequence located at the upstream region of the tryptophan biosynthetic operon:

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5'-AUGAAAGCAAUUUUCGUACUGAAAGGUUGGUGGCGCACUUCCUGA-3'
   MetLysAlaIlePheValLeuLysGlyTrpTrpArgThrSer***
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   Explain the role of the leader peptide in the regulation of the tryptophan operon.

   (10 marks)

[b] Explain what will happen if the two *Trp* codons above encountered a deletion mutation and became just one *Trp* codon.

(5 marks)

[c] Explain what will happen if a frameshift mutation happened one nucleotide after the AUG (Met) codon.

5'-AUGGAAAGCAAUUUUCGUACUGAAAGGUUGGUGGCGCACUUCCUGA-3'

(5 marks)

4. [a] Explain the "antitermination" mechanism employed by the bacteriophage lambda.

(5 marks)

[b] The host nutritional condition is extremely important in the the bacteriophage lambda life cycle. Explain the mechanism that enables lambda to undergo transition from a lysogenic form to an active lytic state.

(15 marks)

5. [a] Explain the regulatory mechanisms acting within *E. coli* cell during these conditions:

[i] Presence of glucose and lactose simultaneously

[ii] Absence of glucose and presence of lactose

[iii] Absence of both glucose and lactose

(12 marks)