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RAJARATA UNIVERSITY OF SRI LANKA
FACULTY OF APPLIED SCIENCES

B.Sc. (Special) Degree in Applied Biology

Fourth Year Semester I Examination – September/October 2019

MIB 4103 – MOLECULAR MICROBIOLOGY

Time: One and half (1.5) hours

Answer THREE (03) questions only.

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1. a). Describe briefly, the molecular mechanism of N-acyl homoserine lactone (AHL induced) bacterial quorum sensing response using *Aliivibrio fischeri* as a model organism.

(30 marks)

b). Describe briefly, currently known quorum quenching mechanisms

(30 marks)

c). "Understanding the molecular mechanisms behind such quorum quenching processes are important for the advancement of medical sciences". Comment on this statement.

(40 marks)

2. a). Comment on why it is important for bacteria to respond to external conditions via two-component systems. In your answer, state what benefits it may confer to bacteria that possess two-component systems. **(40 marks)**

b). Using appropriate diagrams, briefly describe the molecular mechanism behind the classic EnvZ osmolarity sensing two-component system in *E. coli*.

(60 marks)

3. Describe the molecular machinery behind bacterial chemotaxis by the signal transduction pathway from the Methyl-accepting chemotaxis protein (MCP) to the flagellar motor. Use diagrams where necessary.

(100 marks)

4. "The current frontier of microbiology is marked by single-cell microbiology techniques, where molecular and chemical information are gathered and analysed at single-cell level rather than population level".

Discuss the above statement in light of the latest single-cell microbiology technologies. Briefly describe single-cell techniques, their operating principles, advantages of their application in microbiology research.

(100 marks)

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