

**UNIVERSITY OF BOLTON**

**SCHOOL OF ENGINEERING**

**BEng (HONS) BIOMEDICAL ENGINEERING**

**SEMESTER ONE EXAMINATION 2018/2019**

**MOLECULAR AND SYNTHETIC BIOENGINEERING**

**MODULE NO: BME6010**

Date: Tuesday 15<sup>th</sup> January 2019

Time: 14:00 – 16:30

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**INSTRUCTIONS TO CANDIDATES:**

There are **SIX** questions.

Answer **THREE** questions. **ONE** question must be answered from Section A and **ONE** from Section B. The third question can be from **EITHER** section.

All questions carry equal marks.

Marks for parts of questions are shown in brackets.

This examination paper carries a total of 300 marks.

All working must be shown. A numerical solution to a question obtained by programming an electronic calculator will not be accepted.

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School of Engineering  
BEng (Hons) Biomedical Engineering  
Semester One Examination 2018/2019  
Molecular and Synthetic Bioengineering  
Module No. BME6010

Answer **THREE** questions in total. Choose **ONE** question from Section A and **ONE** question from Section B. The third question can be from **EITHER** section.

**Section A**

1. Target gene expression levels are often normalized to the expression of a “housekeeping gene” (reference gene) to correct for differences in the amount of input RNA and variations in reaction efficiency. Synthesize an approach for ‘housekeeping gene’ selection for real-time RT-PCR data normalization.  
**(100 marks)**
2. Analyse the six most common applications of reverse transcription polymerase chain reaction (RT-PCR).  
**(100 marks)**
3. How can amplification of genomic DNA in total RNA samples be avoided? Critically evaluate the three different approaches.  
**(100 marks)**

**Section B**

4. Is Systems Biology a new discipline, a mathematical approach or a collection of tools? Justify your answer.  
**(100 marks)**
5. Compare and contrast the one-step and two-step Real-Time RT-PCR.  
**(100 marks)**
6. Justify why gene arrays have become a powerful approach for comparing complex sample RNA populations.  
**(100 marks)**

**END OF QUESTIONS**