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 4205 – TECHNIQUES AND STRATEGIES IN MOLECULAR BIOLOGY

Time: Two (02) hours

Answer ALL questions.

1. Several new outer membrane proteins (OMPs) from a pathogenic Gram-negative bacterial species were identified. You have been provided with OMP extracts and sera from patients diagnosed with the bacterial infection. Design an experiment to demonstrate the antibody binding potential of the OMPs using blotting techniques and explain how you would interpret results. **(100 marks)**

2. You have been provided with autopsy sections of an individual died from a suspected dengue virus (ssRNA genome) infection. Describe how *in situ* hybridization technique can be utilized to confirm dengue virus infection. **(100 marks)**

3. Describe the experimental workflow of establishing the identity of an environmental bacterial isolate, based on 16s ribosomal RNA gene sequences. **(100 marks)**

4. Design an experiment to produce a mutant protein by creating a disulfide bond between an alanine encoded by GCC and a cytosine residue encoded by either TGT or TGC using site-directed mutagenesis technique. You have the following at your disposal:
   - Dam$^+$ *E. coli* strain.
   - Cloning vector.
   - Expression vector.
   - DpnI restriction enzyme.
   - High fidelity DNA polymerase.
   - All other reagents for cloning and expression of recombinant proteins. **(100 marks)**

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