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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– October/ November 2017

MIB 4205 – ANALYTICAL TECHNIQUES IN BIOLOGY

Time: Two (02) hours

Answer ALL questions.

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1. a) Give four (04) properties of a protein that facilitate the separation of individual proteins in a mixture. **(20 marks)**

   b) There are five (05) proteins in a mixture, with different pI values as 2, 3, 6, 10 and 13.

   Write down the expected order of elution when a cation exchange column equilibrated at pH 8.0 is used. Explain your answer. **(40 marks)**

   c) A student faced the following problems while attempting to study proteins using polyacrylamide gel electrophoresis. Suggest the probable causes and remedies to overcome those problems.

      i. Gel cracking during polymerization

      ii. Variation in the staining density along the width of a stained band

      iii. Heavily stained band at the origin of the separating gel

      iv. Failure of the stacking gel to polymerize **(40 marks)**

2. a) Describe how you would carry out a preliminary study of secondary metabolites present in plants. **(70 marks)**

   b) Discuss the merits and demerits of the analytical methods you have proposed in part (a). **(30 marks)**

3. a) Explain how the information in an UV-visible absorption spectrum of a molecule would be used in determining the concentration of a solution of that molecule. If there is another known compound contaminating your molecule of interest, what modification would you do to your procedure? **(30 marks)**

   b) Although molar extinction coefficients of many molecules are available in the literature, scientists use a standard curve in their experiments to determine the concentration of an analyte. Suggest reasons for this. **(20 marks)**

   c) Discuss the importance of fluorimetry over turbidometry and limitations of these techniques. **(50 marks)**

4. a) Discuss the improvements made in the process of developing ultracentrifuges from early bench-top centrifuges. **(30 marks)**

   b) Point out the relationship between rpm and g in centrifugation. Explain why it is advised to use g, rather than rpm in scientific communications. **(30 marks)**

   c) Give a comparative account on sedimentation centrifugation and isopycnic centrifugation. **(40 marks)**

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