※ 注意：請於試卷內之「非選擇題作答區」依序作答，並應註明作答之部份及題號。

Part A (50%)

1. Define the following terms and tell their differences. You are encouraged to answer the questions with their chemical structures. (**16%**)
   (a) D-arabinose *vs* L-arabinose
   (b) Stachyose *vs* raffinose
   (c) HM pectins *vs* LM pectins
   (d) Distarch phosphate *vs* starch phosphate monoester

2. To explain and contrast the principles (not procedures) in determining the moisture content of food products by the following method, complete the table below. (Assume that sample selection and handling has been done appropriately.) (**12%**)

	How is water removed /reacted/identified?	*What assumptions are made in trusting the date obtained (or precautions taken to ensure accurate data)?*
Microwave oven		
Karl Fischer		
Toluene distillation		

3. Describe the principles behind and the limitations of determining sucrose concentrations by (a) specific gravity determination, (b) RI measurement, and (c) polarimetry. (**9%**)

4. Define solid fat content and explain the usefulness of this measurement. Why low resolution NMR spectroscopy is a powerful tool to measure the SFC in foods? (**8%**)

5. Select the best answer.(**5%**)
   (1) Viscosity is defined as the ratio of
      a. shear stress to shear strain
      b. shear stress to the rate of change of shear strain
      c. shear strain to shear stress
      d. shear strain to the rate of change of shear stress
      e. shear strain to the square of shear stress
   (2) A Newtonian dispersion
      a. Show decreasing viscosity with increasing shear rate.
      b. Shows no change in viscosity with increasing shear rate.
      c. Show increasing viscosity with increasing shear rate.
      d. Non of the above.
   (3) These fluids increase in viscosity with constant shear
      a. Newtonian
      b. Rheopectic
      c. Dilatant
      d. Pseudoplastic
      e. Bingham plastic
   (4) If you were interested in making an oil-in-water (O/W) emulsion, what would be the best emulsifier to use from the list below?
      a. sorbitan monstearate, HLB＝4.7
      b. hexadecano, HLB＝1.0
      c. glycerol monostearate, HLB＝3.8
      d. sodium steroyl-2-lactoyl lactate, HLB＝21.0
      e. a or c
   (5) A foam, such as whipped cream, is an example of a dispersion where the dispersed phase is a (　　) and the continuous phase is a (　　).
      a. solid, liquid
      b. liquid, liquid
      c. gas, liquid
      d. gas, solid
      e. solid, gas

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Part B (50%)

1. For calculating the protein content by the Kjeldahl method, the following equation is used:

$$\frac{5 \text{ mLs HCl} \times 0.1 \text{ N HCl} \times \mathbf{14} \times \mathbf{6.25} \times 100}{\mathbf{1000} \times 0.1 \text{ gram sample}} = 43.75\% \text{ protein}$$

   Describe the terms in bold type (粗體字) and the significance of these values. (**6%**)

2. Your analysis of an oil sample gives the following results. What does each of these results tell you about the characteristic of the sample? Briefly describe the principle for each method used. (**15%**)
   (a) large saponification value. (b) low iodine value. (c) high TBA number.
   (d) high free fatty acid content. (e) high oil stability.

3. Give the basic chemical structure of anthocyanins, and describe the changes of visible spectra, corresponding to the color and structure when anthocyanins be affected by pHs. (**6%**)

4. Explain the following terms regarding protein nutritive value. (**8%**)
   (a) protein efficiency ratio (PER) (b) biological value (BV)
   (c) net protein utilization (NPU) (d) chemical score

5. Draw the chemical structures of the following compounds. (**15%**)
   (a) glutathione（γ-glutamylcysteine glycine） (b) tetramethylammonium hydroxide
   (c) linoleic acid (d) pyruvate (e) ethyl butanoate

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