Name: _____ Student ID _____

Prince of Songkla University
Faculty of Engineering

Exam: Mid Term, Semester II
Date: December 21, 2011
Subject: 230-560 - Food Unit Operations

Academic Year: 2011 – 2012
Time: 1:30 –4:30 PM
Room: A401

ทุจริตในการสอบโทษขั้นต่ำคือ ปรับตกในรายวิชาที่ทุจริต และพักการเรียน 1 ภาคการศึกษา

Instructions: This is a Closed Book exam consisting of 9 pages (not including the cover sheet). The points for each problem are not distributed evenly. Place your name and the student ID number on every page. Students are allowed to use only a pen or pencil and a calculator.

Points Distribution (For Grader Only)		
Part	Points Value	Score
1	20	
2	35	
3	20	
4	15	
5	20	
6	45	
7	15	
Total	170	

Exam prepared by
Ram Yamsaengsung
December 21, 2011

PLEASE CHECK TO MAKE SURE THAT
YOU HAVE ALL 10 PAGES OF THE EXAM BEFORE BEGINNING.
GOOD LUCK!

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I. True and Faults (T/F) (20 points)

___ 1. Whey proteins, gelatin, and soy proteins can be manipulated to form yogurt, cottage cheese, gelatin desserts, and tofu.
___ 2. Pudding can be made by adding cold water to pre-gelatinized starch.
___ 3. Proteins and starches are polymers, which will be in a glassy state above Tg and rubbery state below Tg.
___ 4. Water activity is the ratio P_v/P_s.
___ 5. Emulsifiers are proteins that catalyze chemical reactions.
___ 6. Fructose can be found in sugar beets and sugar cane.
___ 7. Retrogradation is the process in which water is squeezed from the gel as the starch begins to interact and the junction zone collapses.
___ 8. Legumes include beans, peas, and lentils.
___ 9. Gel formation is the result of junction zone formation.
___ 10. Gel is gas dispersed in a liquid.
___ 11 Cornflakes, which have a water activity (a_w) of 0.10, will gain moisture in a 5% RH environment.
___ 12. Shear thinning is the process in which the viscosity of the gelatinized starch paste increases.
___ 13. Lactose has a sweetness value of 0.3 and maltose has a sweetness value of 0.7.
___ 14. Starch is found in granules which have amorphous and crystalline regions.
___ 15. Amylopectin contributes to the high viscosity of the starch paste and amylose contributes to the gelling property.
___ 16. Corn starch can be converted into fructose using acid, heat, and enzyme (producing corn syrup).
___ 17. Potato chips are fried to low moisture content and packed in O_2 environment to preserve freshness and increase the shelf-life.
___ 18. Glucose is the reference point of sweetness and has a value of 1.0.
___ 19. Amylopectin is in the form of linear chains and amylose is highly branched.
___ 20. Proteins provide sensory characteristics of mouth feel, juiciness, and flavor.

II. Fill in the blanks (35 points)

1. The five basic components of food consist of: _____ , _____, _____, _____, and _____.
2. Starch gelatinization takes place in the presence of _____, _____, and _____.
3. During the study of starch gelatinization, the products that were studied included _____, _____, _____ and _____.
4. Shear-thickening fluid has a _____ greater than 1.
5. The types of fluids that have yield stress are _____ and _____.
6. _____ pasteurization (72°C for 16 sec) is used in cheese and milk processing.
7. _____ are used to stabilize oil and fat dispersions.
8. _____, which is extensible, cohesive, and elastic, provides the key properties of dough for making bread.
9. During the _____ process, the viscosity of the starch paste decreases dramatically as the molecules begin to orient themselves in the direction that the system is being stirred.
10. Plants store their surplus energy in two forms: _____ and _____.
11. A solid dispersed in a liquid is called a _____ and gas dispersed in liquid is called a _____.
12. Toothpaste and tomato ketchup (paste) are examples of _____ fluids, while milk and honey are examples of _____ fluids.
13. Starches in their natural form provide _____, _____, _____, and _____.
14. The process in which water seeps (releases) from the gel onto its surface is called _____ or _____.
15. The 2 types of strains _____ strain and _____ strain.
16. In order to prevent water from seeping to the surfaces of gels, _____ is added.
17. Applesauce, banana puree, and orange juice are examples of _____ fluid.

III. Give a brief explanation of the following reactions and give one example of a food product in which this reaction takes place. (20 points)

1. Maillard Browning -

2. Caramelization -

3. Gelatinization -

4. Lipid Oxidation -

5. Retrogradation –

IV. Answer the following questions based on your trip to Tesco Lotus, Hat Yai. (15 points)

(1) Name 4 brands of salty snacks. **(2 points)**

(2) Name 2 examples dessert snacks and 2 of its major ingredients. **(2 points)**

(3) Name 3 brands of ice cream and what is its most important (expensive) ingredient. **(2 points)**

(4) Name 3 brands of soft drinks and what makes it sweet (do not use sugar). **(2 points)**

(5) Name 6 types (plants) of cooking oil. **(3 points)**

(6) List 8 types of fresh fruits in their English names. **(4 points)**

V. Answer the following questions based on your trip to Tesco Lotus Bakery, Hat Yai. (20 points)

(1) Name the 5 sections in which the Lotus Bakery is divided into. **(5 points)**

(2) What is the top selling product at Lotus Bakery? Name 3 products that were being prepared? **(4 points)**

(3) What does DC stand for? **(2 points)**

(4) What is the average temperature and relative humidity used in making dough rise at the Lotus Bakery? **(2 points)**

(5) What are the temperatures used to bake bread and frying doughnuts at the Lotus Bakery? **(2 points)**

(6) Describe the type of mixer used for bread making. Why does it require this shape? **(3 points)**

(7) Why must bread be cooled before slicing? Give 2 reasons. **(2 points)**

VI. Answer the following questions about the Food Companies and Food Ingredients Presentations. (45 points)

(1)Name the 5 companies that were presented by you and your classmates and list two major products, type of products, or businesses by each company. **(6 points)**

(2) Answer the following questions. **(15 points)**

2.1 Which company was founded for 10 million baht?

2.2 Which company has the working theme of SMILE?

2.3 Which company has the slogan "Your Total Quality"?

2.4 Which company uses tropical fruits as its major raw material?

2.5 What company makes I-Healthy (Q10) and owns 108 Shop?

2.6 Which company was founded by Mr. Tan?

2.7 Which company presented by your friends has met the following standards: ISO 9001:2008, ISO 14001:2004, HACCP, GMP, and Halal?

2.8 What company is the youngest of the ones (companies) presented in class?

2.9 What company sends 99% of its exported product to the US, UK, and Japan?

2.10 Which company's products include electronics and footware?

2.11 What does the S in the SMILE campaign stand for?

2.12 Which company owns the restaurant "Chai Talae" – "ชายทะเล"?

2.13 Which company uses a product from "Sriracha" as its major product?

2.14 Which company has more than 600 products and 90 name brands?

2.15 Which company also produces Rice Congee?

(3)Name 5 products that were presented by you and your classmates in the Food Ingredients Presentation. List FOUR MAJOR ingredient in each product (not including water). **Underline** the #1 ingredient in each product. **(15 points)**

(4) For the ingredients presentation that your team gave in class, list the major ingredients and their functions? **(9 points)**

VII. Answer the following questions about the Food Rheology. (15 points)

1. Write down the equation for shear strain and define γ. **(2 points)**

2. Write down the equation for Hookean's Law and define each term. **(3 points)**

3. Write the shear stress versus shear rate equations for the 5 types of time-independent fluids (Newtonian and Non-Newtonians) and write give the approximate value of its flow behavior index, consistency coefficient, and yield stress. **(5 points)**

   General Equation: $\sigma = \sigma_o + K\dot{\gamma}^n$

Fluid	**K**	**n**	σ_o
Herschel-Bulkley			
Newtonian			
Shear-thinning (pseudoplastic)			
Shear-thickening (dilatant)			
Bingham plastic			

4. Draw the shear stress versus shear rate graphs for the 5 types of time-independent fluids (Newtonian and Non-Newtonians). **(5 points)**

Congratulations! End of Exam! Happy New Year's 2012!!!

Bonus: What is "Black Chicken" generally used for in Chinese Cooking? (2 points)