



Uva Wellassa University
Faculty of Animal Science & Export Agriculture

B.Sc in Tea Technology and Value Addition
End Semester Examination – Feb/ March 2012

Year IV Semester I

New Product Development (TEA 434-3)



Instructions

Answer all questions.

No. of questions : Four (04)

No. of pages : Three (03)

Time : 02 hour

Total marks allocated : 60%

Index No :

PART III – ESSAY

Question 01

Occurrence of failures are badly affecting to the reliability and product safety of the newly developed product. Those failures can be prevented if possible causes of failures are systematically identified during the design stages. In order to accomplish this task Fault “tree analysis” (FTA) is very important. Explain the way of Fault tree analysis which use to detect failures at the design stage.

(100 Marks)

Question 02 /

A tea leaf manufacturer wanted to develop a value added high quality tea product with a view to capture a significant portion of the natural brew market. However, as the manufacturer does not have an adequate knowledge to materialize this task, he sought your assistance.

- i. Name three variables that you presume important for this process and justify selection of your variables.

ii. Design an experiment with respect to your variables and explain why do you select that particular design.

iii. Explain, role of experimental designs in product development process.

(100 Marks)

Question 03

An owner of an eating house has purchased a special kind of high quality tea leaf and he wanted prepare the brew out of that to delight his consumers as much as possible. However, he knew that few variables are associating in preparation of an attractive cup of tea, without knowing their optimum levels.

- i. What are the variables that you presume important for preparing of an attractive cup of tea?
- ii. Explain how you are going to determine optimum level of those variables through the design of experiment.
- iii. Briefly explain the outcome of your research findings to the owner of the eating house in order to prepare an attractive cup of tea.

(100 Marks)

Question 04

A cake manufacturer wanted to develop a high quality cake with a soft texture and it should goes hand in hand with a cup of tea. Therefore, he has decided to conduct an experiment with respect to two factor factorial designs with two important variables, namely "shortening agent (Fat) and eggs at two levels, 3% & 6% and 4 & 6 eggs per kg respectively. The soft texture of the cake was measured in terms of the bulk density. Results are given below.

Bulk density of cake with respect to the treatment combinations;

Treatment combination	Bulk density gcm ⁻³
3% Shortening (Fat) and 4 Eggs	0.25
6% Shortening (Fat) and 4Eggs	0.20
3% Shortening (Fat) and 6 Eggs	0.15
6% Shortening (Fat) and 6 eggs	0.10

The matrix for the treatment combinations and effect

Effect	Treatment combination				Divisor
	(1)	a	b	ab	
A	-	+	-	+	2
B	-	-	+	+	2
AB	+	-	-	+	2
Mean	+	+	+	+	2

$$\text{Estimate effect} = \frac{\text{Contrast}}{2^{(f-1)}}$$

$$\text{Sum of square of effect} = \frac{(\text{Contrast})^2}{2^f}$$

- i. Design an experiment with respect to the two factor factorial design
- ii. How many treatment combinations that you are going to test and what they are?
- iii. Complete an ANOVA table using above data
- iv. Determine which factor/s are highly influential in developing a textured cake
- v. Explain the manufacturer how to make high quality textured piece of cake with respect to the outcome of the experiment.

(100 Marks)