Uva Wellassa University
Faculty of Animal Science & Export Agriculture
BSc in Palm & Latex Technology & Value Addition

End Semester Examination – March/April 2013
Year II Semester II /Year III Semester I

Palm and Latex Industrial Machinery (PLT 234-2)

Instructions
Answer **all** questions
No. of questions : Four (04)
No. of pages : Two (02)
Time : Two (02) hours
Total marks allocated : 40%

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Question 01

I. Explain the flow (rheological) behaviourof following materials when a stress is applied, hold and subsequently removed.
   a) Compounded natural rubber (before vulcanization)
   b) Compounded vulcanizate of natural rubber(after vulcanization)

II. Compare and contrast the flow behaviour of above two materials

(Note: Answer should include graphical presentation of stress and strain with respect to time)

(25 marks)

Question 02

I. Two natural rubber (NR) compounds were prepared using a laboratory scale two roll mill according to the formulation given below. Tensile properties of both vulcanizates (NR-A and NR-B) were analyzed using a tensile machine.

Compounding ingredients	NR-A(phr)	NR-B(phr)
Natural rubber	100	100
$CaCO_3$	40	-
Hard clay	-	40
Zinc Oxide	05	05
Stearic acid	02	02
Sulphur	2.5	2.5
Vul. accelerator	1	1

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a) Draw the possible stress-strain curves for both vulcanizates and show how you could obtain tensile properties from the curves
b) Compare the two stress-strain curves and suggest the possible reasons for this behaviour

II. NR-A compound was additionally mixed with 40 phr of carbon black (CB) and analyze for hysteresis using the same tensile machine
a) Draw the hysteresis curves (hysteresis loop) for both compounds (i.e. NR-A and NR-A with CB
b) Compare and contrast the hysteresis curves of both compounds

(25 marks)

Question 03

Discuss how you could effectively use operating parameters of a laboratory scale internal mixture to prepare a rubber compound with a uniform dispersion and distribution of carbon black

(25 marks)

Question 04

Briefly discuss the following;

I. Thermo-oxidative stability of a rubber compound can be evaluated using an Oscillating Disc Rheometer (ODR)

II. Nitrile rubber (NBR) is preferred over natural rubber (NR) for making oil seals

III. Mooney Viscometer can be used to measure the elastic behaviour of a rubber compound

(25 marks)