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

End Semester Examination - August/September 2014
Year II Semester II

Palm and Latex Industrial Machinery PLT- 234-2

Instructions
Answer **all** questions
No. of questions : Four (04)
No. of pages : Two (02)
Time : Two hours
Total marks allocated : 100%

Index No: .....

Question 01

Write short notes on the followings.

I. Compression moulding of rubber compounds

II. Rebound resilience of carbon black filled natural rubber vulcanizate in comparison to natural rubber gum vulcanizate.

(25 marks)

Question 02

Mooney viscosity of three different types of raw natural rubber was measured using a Mooney viscometer. Mooney viscosity data of raw rubber is shown in the following Table.

Type of raw rubber	FB crepe rubber	UFUB crepe rubber	Skim rubber
Mooney Viscosity M L 1+ 4 (100 °C)	64	75	88

FB –fractionated bleached
UFUB – Un-fractionated unbleached crepe rubber
Skim rubber – By-product of centrifuged latex manufacturing process

I. Briefly explain the basic principle and operating procedure of Mooney viscometer

II. Briefly discuss the possible reason/s for different Mooney viscosity values for the above different raw rubber types.

III. Draw the potential Mooney curves for above raw rubbers (i.e. FB, UFUB and skim rubber) in a single graph

(25 marks)

50

Question 03

Briefly discuss the followings.

I. Operating parameters of a laboratory scale internal mixer is useful to achieve the uniform dispersion and distribution of fillers in a rubber compound.

II. Initial Plasticity (Po) of raw rubber provides processability information.

III. Natural rubber is a viscoelsatic material and its viscoelasticity is significantly altered with the vulcanization

(25 marks)

Question 04

Two natural rubber (NR) compounds were prepared using a laboratory scale internal mixer operated with a rotor speed of 60 rpm at 60 °C for 10 minutes, according to the formulation given in the below Table .

Compounding ingredients	NR-A (phr)	NR-B (phr)
Natural rubber	100	100
Carbon black	60	-
$CaCO_3$	-	60
Processing oil	10	-
Zinc Oxide	05	05
Stearic acid	02	02
Sulphur	2.5	2.5
Vul. accelerator	1.5	1.5

I. When vulcanization characteristics were measured with a rheometer, predict the cure curves (rheographs) for both rubber compounds
(Note: both cure curves should be drawn in the same graph)

II. Compare the two rheographs and suggest possible reasons for this behaviour

III. Briefly explain the reinforcement behaviour of these compounds by predicting stress-strain curves of the both vulcanizates

IV. Discuss the heat build-up behaviour of the both vulcanizates (NR-A and NR-B) when they are subjected to dynamic application.

(25 marks)