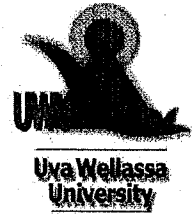


**Uva Wellassa University**  
**Faculty of Animal Science and Export Agriculture**  
**BSc in Palm and Latex Technology & Value Addition**



**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.

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**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)

### 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 ( $P_0$ ) of raw rubber provides processability information.
- III. Natural rubber is a viscoelastic 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 <sub>3</sub>	-	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)