UNIVERSITY OF SWAZILAND
FINAL EXAMINATION PAPER

***COURSE CODE*: LUM 301**

TITLE OF PAPER: - FARM MACHINERY

DIPLOMA IN AGRICULTURE YEAR 3
DIPLOMA IN AGRICULTURAL EDUCATION YEAR 3

TIME ALLOWED: TWO (2) HOURS

SPECIAL MATERIAL REQUIRED: **CALCULATOR & PSYCHROMETRIC CHART**

INSTRUCTIONS: ANSWER QUESTION ONE AND ANY TWO OTHER QUESTIONS.

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SECTION II: ANSWER ANY TWO QUESTIONS

QUESTION TWO

(a) Define the following terms:
- i) spot rate of work
- ii) overall rate of work
- iii) seasonal rate of work
- iv) calendar rate of work (10 Marks)

(b) A forage field is 10 km from the hay storage shed. Grass yield (Y) is estimated at 15.7 t/ha. A self propelled forage harvester with material throughput capacity (MTC) of 29.06 t/h has been hired to harvest the hay. Recommend the number of trailers and tractors required to keep up with the harvester given the following:

- i) trailer capacity is 10 tonnes
- ii) average road speed is 50km/hr
- iii) time taken to couple the empty and the loaded trailers to the forage harvester and tractor respectively is 2 minutes
- iv) tipping time at the silage clamp is 3 minutes (10 Marks)

(c) State the three components of a transport system giving examples of each. (6 Marks)

(d) List the major factors that constitute the vicious transport circle. (4 Marks)

QUESTION THREE

(a) Define the following terms:
- i) Equilibrium Moisture Content
- ii) Critical Moisture Content
- iii) Absolute Humidity
- iv) Specific Volume
- v) Enthalpy (10 Marks)

(b) A bin full of maize grain is to be dried with air at a dry bulb temperature of 50°C and an airflow rate of 33 m^3/min. The ambient air conditions are 30°C(Td.b.) and 22°C(Tw.b.) while the outgoing air is fully saturated, determine:

(i) The amount of heat required per hour to heat the air. (10 marks)
(ii) The amount of water removed per hour from the grain. (10 marks)

(a) State the objectives of crop spraying? (5 Marks)

(b) What safety precautions should be taken when working with agro-chemicals? (5 Marks)

(b) Briefly discuss how chemical sprayers transform spray liquid to spray droplets. Indicate the factors that influence the sizes of spray droplets. (10 Marks)

(c) A tractor operates a field boom sprayer at a speed of 6 km/hr applying a pre-emergence herbicide. The boom has tapered edge flat fan nozzles with a spray angle of 110° and spaced at 45 cm apart. The recommended application rate for the herbicide is 200 litres per hectare.

(i) Calculate the required individual nozzle output in litres per minute. (5 Marks)

(ii) Calculate the boom height above the ground to achieve 50% spray overlap. (5 Marks)