UNIVERSITY OF SWAZILAND
FINAL EXAMINATION PAPER

PROGRAMME: BSC AGRIC 4 (LWM), BSC AGRIC 4 (CP)

COURSE CODE: LUM 405

TITLE OF PAPER: MECHANISATION MANAGEMENT

TIME ALLOWED: TWO (2) HOURS

SPECIAL MATERIAL REQUIRED: NONE

INSTRUCTIONS: ANSWER QUESTION ONE AND ANY TWO OTHER QUESTIONS.

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SECTION I: COMPULSORY

QUESTION 1

(a) Machine performance is critical in the management of farm machinery. Field efficiency is possibly the most critical factor in the estimation of the performance of field equipment. Briefly discuss any **THREE** ways of improving field efficiency. (15 Marks)

(b) A 5m width-of-cut self-propelled combine makes an average stop of 4 minutes every time its 2 tonne grain tank is to be unloaded. This stop includes the time for adjustments, lubrication, refuelling, and the operator's time. The gross yield of the field is 2.1t/ha. Material losses are measured as 0.1t/ha. The operating speed is 4.8km/h. The time for turning on a headland at the ends of the 400m-field is 15 seconds. The average actual width of cut is 0.95 of theoretical. Find:

(i) Theoretical field capacity;
(ii) Effective for actual field capacity;
(iii) Field efficiency;
(iv) Per cent time loss; and
(v) Material efficiency. (15 Marks)

(c) Explain how network analysis can be applied in agricultural production systems. (10 Marks)

SECTION II: ANSWER TWO QUESTIONS

QUESTION 2

(a) Operator performance has a greater bearing on the performance of farm machinery than most people realise. Discuss this statement. (15 Marks)

(b) Farming operations are time sensitive. This sensitivity is taken into account in selecting machinery in the form of timeliness costs. Using the formula below, discuss how timeliness costs can affect the size of an implement selected.

QUESTION 2 (b) continued

$$TC = \frac{KYVA^2}{(sc)(nt)UZ}$$

where K = timeliness loss factor, 1/day
Y = potential crop yield, kg/ha
V = value of crop, E/kg
A = crop-area involved
U = fractional utilisation of total time, decimal
sc = 2 for premature or delayed schedules, 4 for balanced
nt = number of times A should be divided because of dispersed optimum times
Z = effective machine capacity, area/day

(15 Marks)

QUESTION 3

(a) Write short notes on the following:

(i) Work study;
(ii) Work measurement. (10 Marks)

(b) Explain the relevance of the items in (a) above to agricultural mechanisation. (10 Marks)

(c) Explain how maintenance strategy adopted by a farming organisation would influence replacement of machinery on the farm. (10 Marks)

QUESTION 4

(a) Where available, farmers use contractors extensively. Briefly discuss **THREE** reasons for using a contractor.

(15 Marks)

(b) Outline how you would go about determining the area (ha) to be worked using a contractor or buying own equipment.

(15 Marks)