



**UNIVERSITY OF SWAZILAND  
FINAL EXAMINATION PAPER**

**PROGRAMME: BSC AGRIC. 4 (APH)  
BSC AGRIC. ED. 4**

**COURSE CODE: LUM 401**

**TITLE OF PAPER: FIELD AND FARMSTEAD POWER**

**TIME ALLOWED: TWO (2) HOURS**

**SPECIAL MATERIAL REQUIRED: NONE**

**INSTRUCTIONS: ANSWER QUESTION ONE AND ANY TWO  
OTHER QUESTIONS.**

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GRANTED BY THE CHIEF INVIGILATOR**

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**QUESTION 1**

- (a) Explain why people associate agricultural mechanisation with the agricultural tractor. (20 Marks)
- (b) Many African Governments, soon after independence, initiated tractor hire schemes but in the majority of cases they have collapsed. Explain why the schemes were started and why they failed. (20 Marks)

**QUESTION 2**

- (a) Explain the role of tractor testing facilities, such as the Nebraska Tractor Testing Centre. (10 Marks)
- (b) Using the Zoz chart, determine the tractive efficiency and slip developed by a two-wheel tractor operating in a tilled soil at a speed of 10.0 km/h, given that the drawbar pull developed is 9.0kN when pulling a semi-mounted implement and the tractor mass distribution is 3643kg on the rear axle. (20 Marks)

**QUESTION 3**

- (a) Write short notes on the following:
- (i) Spot work rates;
  - (ii) Seasonal work rates;
  - (iii) Field efficiency. (15 Marks)
- (b) Discuss how the following affect field efficiency:
- (i) Field size and shape;
  - (ii) Fieldwork patterns;
  - (iv) System limitations. (15 Marks)

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**QUESTION 4**

- (a) Explain the relevance of record keeping with regard to machinery selection and replacement. (15 Marks)
- (b) Given the following past records, determine the age at which a Massey Ferguson MF 375 tractor with an initial cost of E175 000, should have been replaced (show all your work).

YEAR	1	2	3	4	5	6	7	8
TOTAL RUNNING COSTS	30 000	40 000	45 000	60 000	75 000	95 000	115 000	135 000
RESALE PRICE	90 000	50 000	25 000	12 500	10 000	8 000	7 000	6 000

(15 Marks)

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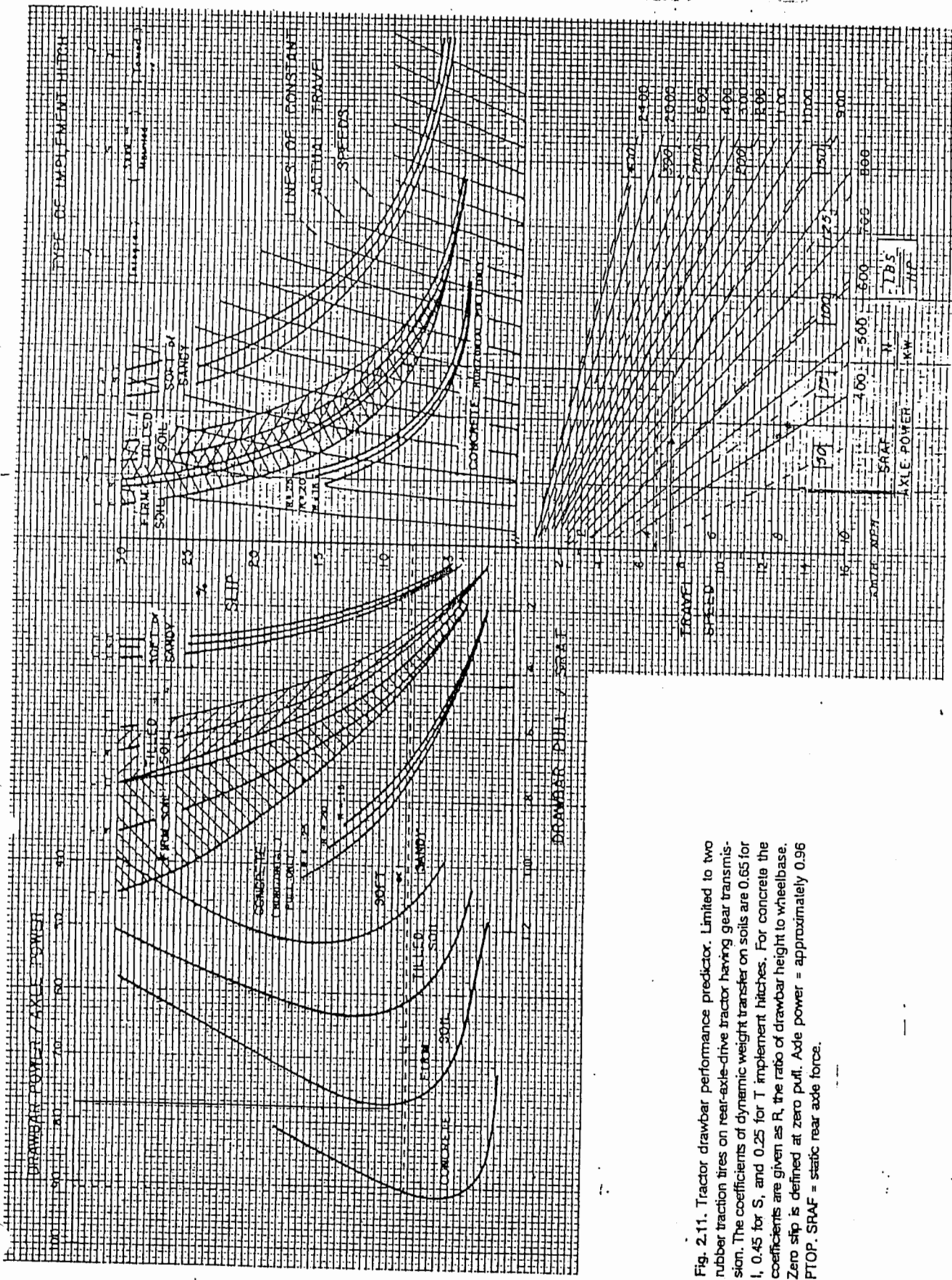


Fig. 2.11. Tractor drawbar performance predictor. Limited to two rubber traction tires on rear-axle-drive tractor having gear transmission. The coefficients of dynamic weight transfer on soils are 0.65 for 1, 0.45 for S, and 0.25 for T implement hitches. For concrete the coefficients are given as R, the ratio of drawbar height to wheelbase. Zero slip is defined at zero pull. Axle power = approximately 0.96 P.T.O.P. SRAF = static rear axle force.