

1st SEM. 2006/2007

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**UNIVERSITY OF SWAZILAND
FINAL EXAMINATION PAPER**

COURSE CODE: LUM 201 (OLD PROGRAMME)

TITLE OF PAPER: - FARM POWER

BSc. AGRICULTURE YEAR 2

BSc. AGRICULTURAL EDUCATION YEAR 2

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**

SECTION ONE: COMPULSORY

QUESTION ONE

- (a) Define the following terms as they apply in internal combustion engines;
- (i) Cylinder bore
 - (ii) Stroke
 - (iii) Compression ratio
 - (iv) Clearance volume
 - (v) Piston displacement
 - (vi) Displacement volume
 - (vii) Piston speed (7 Marks)
- (b) A Massey Ferguson 1035 diesel tractor has a three cylinder, four stroke internal combustion engine. The cylinder bore is 88.9 mm, the stroke is 127 mm, compression ratio is 16.5: 1 and engine speed is 2000 revolutions per minute. Calculate (i) Clearance volume, (ii) Piston displacement, (iii) Displacement volume, and (iv) Piston speed (10 Marks)
- (c) You have been assigned to assist a farmer who has failed to start his tractor. Your trouble shooting exercise indicates that there are air locks in the diesel fuel line. Precisely describe how you would bleed the air locks. (10 Marks)
- (d) How do you differentiate the following types of tractors by merely looking at them; (i) a two-wheel drive, (ii) a four-wheel drive and (iii) an auxiliary four-wheel drive (6 Marks)
- (e) Briefly discuss the considerations of ensuring tractor battery care (7 Marks)

SECTION II: ANSWER ANY TWO QUESTIONS

QUESTION TWO

- (a) Define rolling resistance and discuss the factors affecting it. (10 Marks)
- (b) With the aid of a sketch diagram, describe the diesel fuel system indicating pressure differences in the fuel lines (10 Marks)
- (c) Determine the belt length required to transmit power from a 50 mm diameter pulley to a 350mm diameter pulley. The pulleys centres are 750 mm apart. (10 Marks)

QUESTION THREE

- (a) Describe **THREE** ways of hitching implements on a tractor (5 Marks)
- (b) Explain the need for ballasting on tractors, the forms it takes on conventional tractors and the operations in which the ballasting is important. List two factors that limit the level of ballasting. (15 Marks)
- (c) A certain tractor design requires a total reduction in bottom gear of 200: 1. A linkage reduction provides 1.5: 1, a differential gear gives 4.5: 1 and the final reduction unit in each axle gives 1.8: 1. What reduction is required in the main gearbox? (10 Marks)
- (d) Outline the differences between range and splitter speed reduction in tractor transmission systems. (5 Marks)

QUESTION FOUR

- (a) List five common causes of engine overheating (5 Marks)
- (b) Explain the significance of Power Take Off (PTO) in tractors? (5 Marks)
- (c) Explain the operation of an oil bath type air cleaner. Why is it important to maintain a correct oil level in the oil bowl? (10 Marks)
- (d) What is the indication of white, blue/grey and black smoke coming out of an engine? (10 Marks)