



**UNIVERSITY OF SWAZILAND
FINAL EXAMINATION PAPER**

**PROGRAMME: DIPLOMA IN AGRICULTURE 1
DIPLOMA IN AGRICULTURAL EDUCATION 1
DIPLOMA IN HOME ECONOMICS 1
DIPLOMA IN HOME ECON. EDUCATION 1
REMEDIAL YEAR IN AGRICULTURE
REMEDIAL YEAR IN AGRIC. EDUCATION
REMEDIAL YEAR IN HOME ECONOMICS
REMEDIAL YEAR IN HOME ECON. EDU.**

COURSE CODE: LUM 100

TITLE OF PAPER: PHYSICS

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 I
COMPULSORY

QUESTION 1

- a) Write down the dimension of
- i) Density, **[6 Marks]**
 - ii) Work, **[4 Marks]**
 - iii) Pressure, **[10 Marks]**
- b) What conditions must be fulfilled for a body to be in equilibrium?
- [4 Marks]**
- c) The discharge (Q) from a pipe depends on the diameter (d) of the pipe and the velocity (v) of the liquid through the pipe. Using dimensional analysis derive the equation for discharge as a function of diameter and velocity.
- [10 Marks]**
- d) Define the following terms;
- (i) Density **[2 Marks]**
 - (ii) Hydrostatic pressure **[2 Marks]**
 - (iii) Electric motor **[2 Marks]**
 - (iv) Atmospheric pressure **[2 Marks]**
 - (v) Transformer **[2 Marks]**
- e) Find the combined resistance of 5 Ohms, 10 Ohms, 15 Ohms and 20 Ohms in;
- (i) Series circuit connection. **[2.5 Marks]**
 - (ii) Parallel circuit connection **[2.5 Marks]**

- f) If a convex mirror is having a radius of curvature of 20cm and an object is placed 5cm in front of the mirror, find the image distance, nature and the magnification.

[5 Marks]

SECTION II
CHOOSE ANY TWO QUESTIONS

QUESTION 2

- a) The figure 1 shows tractor A towing tractor B. If an acceleration of 2.2 ms^{-2} is observed, what is the tension in the towbar P? The tractors have masses of 650 kg each.

(12 marks)

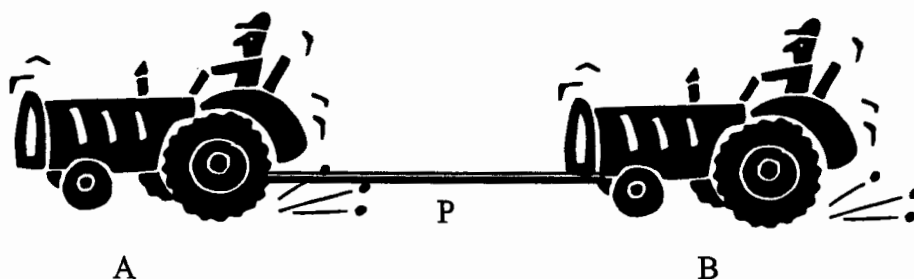


Figure 1: Tractor A towing tractor B

- b) Name two examples where friction is useful.
- c) A tractor pulls a plough through the soil during ploughing at a constant velocity of 5 ms^{-1} . If the tractor provides a drawbar power of 16 kW, calculate the resistance of the soil.

[6 Marks]

[12 Marks]

QUESTION 3

- a) What is meant by:
- i) Specific heat capacity,
 - ii) Calorific value,
- [6 Marks]**
- b) How much heat is required to raise the temperature of 0.2 kg of aluminium from 18°C to 63°C , assuming the specific heat capacity of aluminium to be $950 \text{ J/kg }^{\circ}\text{C}$
- [9 Marks]**
- c) If the heated aluminium in b) above is immersed in 1.4 kg of water contained in a copper calorimeter at 12°C , calculate the temperature attained by the water, assuming no loss of heat. The mass of the calorimeter is 0.25 kg and the specific heat capacity of copper is $390 \text{ J/kg }^{\circ}\text{C}$
- [15 Marks]**

QUESTION 4

- a) Define the following terms used in the study of sound:
- (i) Amplitude **[2 Marks]**
 - (ii) Frequency **[2 Marks]**
 - (iii) Wavelength **[2 Marks]**
- b) If the Domestic Bursar of Luyengo campus has purchased bags of rice, how would you advise her to load them so as to have minimum pressure using your knowledge of physics. **[5 Marks]**

- c) Calculate the pressure in N/m^2 at the bottom of a pool of water 15cm deep due to the water above it. (Density of water= 1000kg/m^3)

[10 Marks]

- d) Estimate the cost of using the New Lecture Theatre(NLT) at Luyengo campus for 8hrs of lectures in a day. Assume that the power supply to Luyengo campus is 240v and the lecture theatre has 40 tubes of 120watts each. The Swaziland Electricity Board charges 30 cents per power unit consumed.

[9 Marks]