



**UNIVERSITY OF SWAZILAND**

**SUPPLEMENTARY EXAMINATION PAPER**

**PROGRAMMES:**

BSc. Agric. Econ and AgBMgt 1, BSc. Ag.Ed 1, BSc. Agron 1, BSc. An. Sc 1, BSc.

FSNT 1, BSc. Home Econ 1, BSc. Home Econ. Ed 1, BSc. Hort 1, BSc. LWM 1, BSc.

TADM 1

**COURSE CODE:** LUM 101

**TITLE OF PAPER:** PHYSICS

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

**SPECIAL MATERIAL REQUIRED:** NONE

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

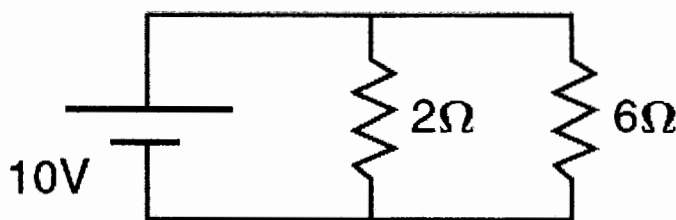
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THE CHIEF INVIGILATOR**

**QUESTION 1**

a. A box of mass 3.60 kg travels at constant velocity down an inclined plane which is at an angle of  $42.0^\circ$  with respect to the horizontal. A string tied to the box exerts a vertical force (vertical to the horizontal) of 7.38N.

- (i) Draw a free body diagram showing all the forces. [10 marks]
- (ii) What is the kinetic coefficient of friction? [ 15 marks]

b. In this circuit, what is the current through the 2-ohm resistor? [10 marks]



c. State the Newton's Laws of motion. [5 marks]

**QUESTION 2**

a. A pitcher throws a ball at an angle of  $37^\circ$  with the horizontal and observes that the ball stay in the air for 2.5 seconds before hitting the ground. Neglecting air frictions, and the height of the pitcher, find;

- (i) The initial speed of the ball. [7.5 marks]
- (ii) Maximum height reached by the ball. [7.5 marks]

- (iii) How fast would the pitcher have to run (at constant speed) to catch his own ball? [7.5 marks]

b. Give the dimensions of the following;

- (i) Velocity [2.5 marks]  
(ii) Pressure [2.5 marks]  
(iii) Energy [2.5 marks]

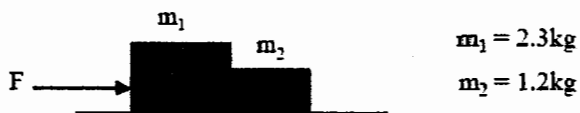
### QUESTION 3

a. State the principle of conservation of energy and explain how this principle is applied when a ball is thrown vertically upwards. [10 marks]

b. What conditions must exist for a body to be at equilibrium. [5 marks]

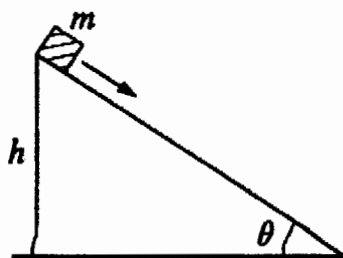
c. Two blocks lie in contact on a frictionless table as shown below. A force  $F=3.2\text{N}$  is applied to one of the blocks. What is the normal force between the two blocks?

[15 marks]



## QUESTION 4

a.



A block of mass  $m$  sliding down an incline at constant speed is initially at a height  $h$  above the ground as shown in the figure above. The coefficient of kinetic friction between the mass and the incline is  $\mu$ . If the mass continues to slide down the incline at a constant speed, how much energy is dissipated by friction by the time the mass reaches the bottom of the incline? **[10 marks]**

b. Water for a shower is heated as it flows past an electric element. What is the flow rate of the water when the heater supplies 7kW and warms the water from 15°C to 45°C? (Assume that 1 liter of water has a mass of 1kg and that the specific heat capacity of water is 4200 Jkg<sup>-1</sup>K<sup>-1</sup>) **[10 marks]**

c. Two resistors having resistance of 1.7Ω and 4.7Ω are connected in series with a battery of electromotive force (e.m.f) of 12V and negligible internal resistance. Determine;

- (i) The potential difference across each of the resistors. **[5 marks]**
- (ii) What is meant by the expression *an e.m.f of 12V*? **[5 marks]**