UNIVERSITY OF SWAZILAND
SUPPLEMENTARY EXAMINATION PAPER

PROGRAMME: DIP AGRIC I & DIP AGRIC ED. I
DIP HOME ECON. I & DIP HOME ECON. ED. I
REM HOME ECON. & REM HOME ECON. ED
REM AGRIC & REM AGRIC. ED.

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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SECTION I

COMPULSORY

QUESTION 1

a) State uses of dimensional analysis in scientific work.

[6 marks]

b) What conditions must exist for a body to be in equilibrium?

[4 marks]

c) A ball is thrown vertically upwards with a velocity of 15 ms-1. Calculate

i) The greatest height the ball will rise;

ii) The velocity with which it will return to the ground.

[10 marks]

d) A cylindrical beaker of mass 50gm and cross-sectional area $25cm^2$ and height 10cm is filled with oil of density $0.8g/cm^3$.

i. What is the total mass of the cylinder and oil?

[5 marks]

ii. If a pierce of aluminium of mass 88g and density $2.2g/cm^3$ is lowered carefully into the beaker, what volume of the oil will overflows.

[5 marks]

iii. What is the final mass of the beaker and its content after the outside has been wiped dried.

[10 marks]

SECTION II

CHOOSE ANY TWO QUESTIONS FROM THIS SECTION.

QUESTION 2

a) State two conditions that would determine that a body is in equilibrium.
[4 marks]

b) State Newton's laws of motion.
Which of Newton's laws of motion satisfies the condition for equilibrium?
[10 marks]

c) A tractor of 2500 kg acting at the centre of gravity G stands on a level ground. If each axle has two wheels, calculate the weight that must be carried by each of the front and rear wheels. If a plough, whose mass is 500 kg and acts at its centre of gravity H, is hitched on the tractor calculate the new loads on the front and rear wheels.
[16 marks]

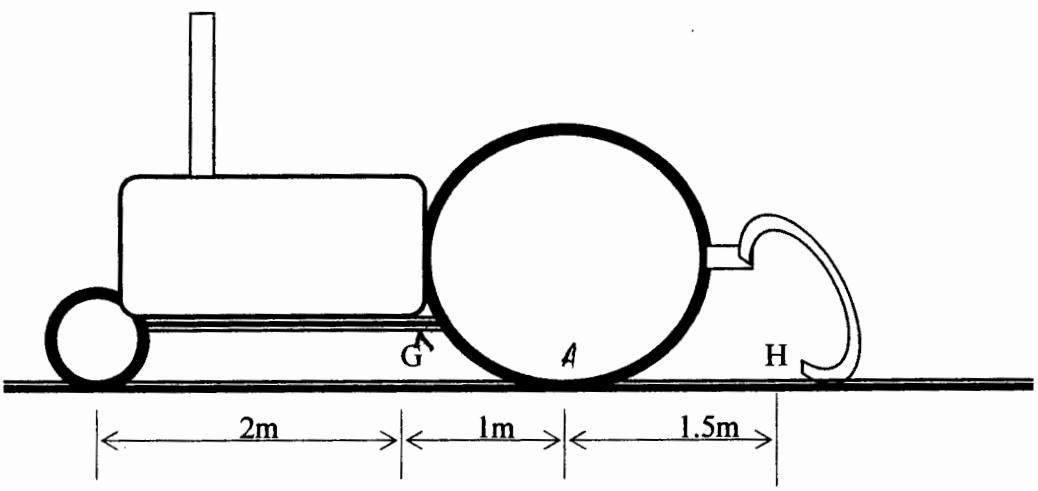

Figure 1. Farm tractor standing on the ground

QUESTION 3

a) Concave and convex mirrors are both parts of a sphere, yet they are different in many respects. Discuss the various differences between a concave and convex mirrors.

[5 marks]

b) Define the following terms as they apply to curved mirrors: principal axis, radius of curvature, principal focus and focal length.

[4 marks]

c) A concave spherical mirror of radius of curvature 20cm forms an erect image 30cm from the mirror and 5cm high. Find the position and size of the object and show with a scale diagram how the object is formed.

[6 marks]

d) Briefly define or describe magnetism and magnet. You are given three identical iron bars two of which are known to be magnets but only one of them is labelled. Describe a simple test you would carry out to determine which of them is not a magnet.

[5 marks]

e) Fig 2 shows a cell C supplying current to resistors A and B. The resistance of each is shown on the diagram. The current in A is 1.2A. Find the currents in A and B.

[10marks]

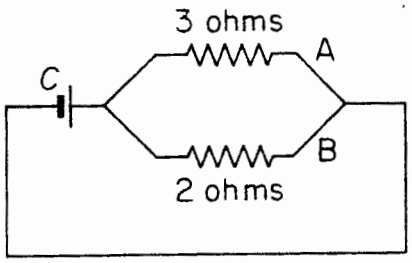

Fig 2; Electric circuit

QUESTION 4

a) State the principle of floatation

[5 marks]

b) An iron cube has a volume of $1500cm^3$ and is completely immersed in three different liquids of relative densities 1, 0.8 and 0.0015 respectively. Calculate the upthrust in each case.

[10 marks]

c) Briefly differentiate between light reflection and refraction

[5 marks]

d) Three resistances are 3.5, 2.75 and 4 ohms respectively. Calculate the difference between the total resistances when they are arranged in parallel and when arranged in series.

[10 marks]