



**UNIVERSITY OF ESWATINI
RESIT EXAMINATION PAPER**

**PROGRAMME: ALL YEAR ONE PROGRAMMES
(AGRICULTURE & CONSUMER SCIENCES)**

COURSE CODE: ABE102

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) A pilot flies 40.0 km in a direction 60 north of east and then flies 30.0 km in a direction 15 north of east. Find the distance from the starting point and the direction Θ of the straight-line path to the final position using the analytical method. Provide a graphical representation of the flown path.

[10 marks]

- b) Below is a known and important motion equation used to calculate distance. Check if the equation as written below is dimensionally correct.

$$x = x_0 + v_0 t + \frac{1}{2} a t^2$$

[10 marks]

Where x is the distance travelled, x_0 is the initial distance, t is time taken, a is acceleration and v_0 is the initial velocity.

- c) If a man requires an average of 12,000 kJ of food energy per day, yet consumes 13,000 kJ, he will steadily gain weight, unless he works off the extra 1000 kJ. If 400 watts is worked off when cycling at a moderate speed, how long (minutes per day) should he cycle to burn off that extra 1000 kJ?

[10 marks]

- d) Write the term defined here:

- i) Quantities that have both magnitude and direction (e.g. velocity).
- ii) An explanation of patterns in nature that is supported by scientific evidence and verified multiple times by various groups of researchers
- iii) A tenth of a metre
- iv) An explanation of how close the agreement is between repeated measurements (which are repeated under the same conditions).
- v) A form of acceleration in the direct opposite to the direction of the velocity, where speed is always reduced.

[10 marks]

SECTION II ANSWER ANY TWO QUESTIONS

QUESTION 2

- a) Define the following terms as used in physics, and give an example where applicable i.e. conduction, convection and radiation [12 marks]
- b) Briefly explain the following concepts:
- (i) Bernoulli theorem
 - (ii) Stefan-Boltzmann law
 - (iii) Inertia

[18 marks]

QUESTION 3

- a) The diameter of a water pipe gradually changes from 5 cm at the entrance, Point A, to 15 cm at the exit, Point B. The exit is 5 m higher than the entrance. The pressure is 700 kPa at the entrance and 664 kPa at the exit. Friction between the water and the pipe walls is negligible. The water density is 1000 kg/m^3 . Calculate the discharge (in m^3/s) at the exit. Show a sketch as part of your working. [15 marks]
- b) Distinguish between:
- (i) Heat and temperature
 - (ii) Potential difference and electromotive force
 - (iii) Fundamental and derived quantities
 - (iv) Specific weight and specific gravity
 - (v) Velocity and speed

[15 marks]

QUESTION 4

- a) Define the following:
- (i) A fluid
 - (ii) Terminal velocity
 - (iii) An insulator
 - (iv) Normal Force
 - (v) Static friction

[20 marks]

- b) Calculate the total resistance of a circuit having three resistances; 3.5, 2.75 and 4 ohms in series. If the resistances are then placed in parallel, what will be the new value of total resistance?

[10 marks]