25
COPIES

ZIMBABWE SCHOOL EXAMINATIONS COUNCIL

General Certificate of Education Advanced Level

PHYSICS

9188/3

PAPER 3

NOVEMBER 2012 SESSION

50 minutes

Additional materials:
Answer paper
Electronic Calculator and / or Mathematical tables
Ruler (mm)

TIME 50 minutes

INSTRUCTIONS TO CANDIDATES

Write your name, Centre number and candidate number in the spaces provided on the answer paper/answer booklet.

Answer **three** questions.

Question 1 is compulsory.
Answer any other **two** from the remaining questions.

Write your answers on the separate answer paper provided.
If you use more than one sheet of paper, fasten the sheets together.
All working for numerical answers must be shown.

INFORMATION FOR CANDIDATES

The number of marks is given in brackets [ ] at the end of each question or part question.
You are reminded of the need for good English and clear presentation in your answers.

Candidates are advised to spend 25 minutes on **question 1**.

This question paper consists of 8 printed pages.

[Turn over

*Answer **question 1** and **any other 2** from the remaining questions.*

1 (a) (i) Define the term *friction.*

(ii) A granite block is static on a flatbed trailer. If the coefficient of static friction is μ_s, write an expression for the friction when the block is about to move.

(iii) Explain whether an unsecured granite block will shift on the flatbed trailer if the trailer driver

1. takes off gradually,

2. stops suddenly.

[6]

(b) According to Newton's Law of gravitation there is always attraction between objects.

Explain why people do not feel themselves being pulled towards massive buildings in their vicinity. [2]

(c) **Fig. 1.1** shows the variation of potential energy, U, with position, x, of a 4 kg particle executing simple harmonic motion.

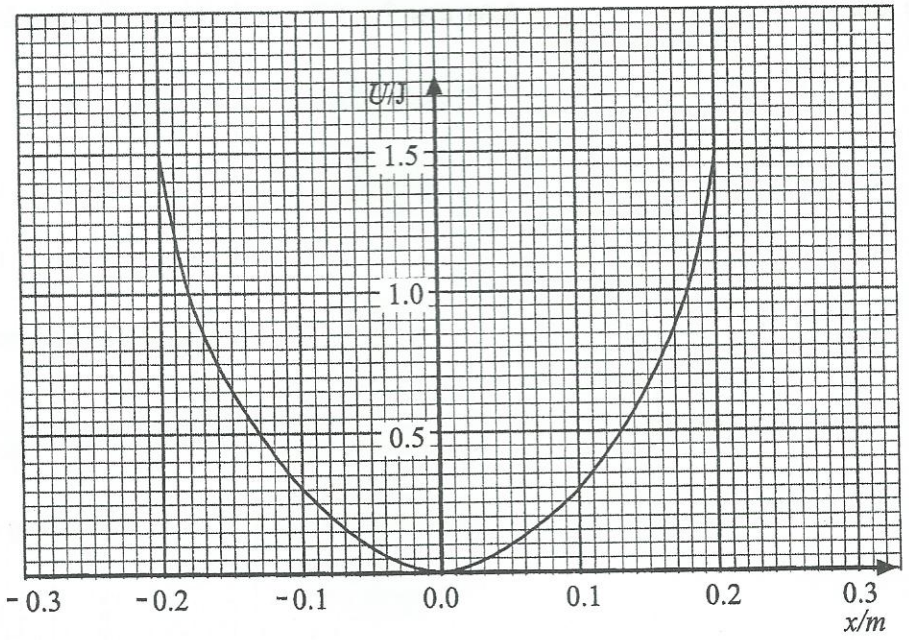

Fig. 1.1

(i) State the amplitude of oscillation.

(ii) Determine the period of oscillation.

[4]

(d) (i) Explain the term *resonance*.

(ii) A well with vertical walls resonates with a sound note of frequency 7.0 Hz and does not resonate at lower frequencies.

Estimate the depth of the well, if the speed of sound in air is 350 ms^{-1}.

[4]

(e) Express each of the following quantities in base units:

(i) resistance

(ii) Young Modulus

[4]

2 (a) State *the principle of conservation of linear momentum.* [2]

(b) A stationery ball of mass, 6.0×10^{-2} kg is hit horizontally with a tennis racket. The ball is in contact with the racket for 30 ms and leaves the racket with a speed of 27 ms^{-1}.

(i) Calculate the

1. change in momentum of the ball,

2. average force which the racket exerts on the ball,

3. horizontal distance travelled by the ball before it hits the ground if it leaves the racket at a vertical height of 2.5 m.

(ii) Explain what is meant by *an inelastic collision.*

(iii) Suggest a reason why the collision between the ball and the racket is inelastic.

[8]

3 (a) Give a simple description of the production of X-rays. [4]

(b) State the approximate wavelength of

(i) the visible,

(ii) the X-ray,

region of the electromagnetic spectrum. [2]

(c) (i) Give a reason why laser light is ideal for diffraction and interference in double slit experiments.

(ii) In the diffraction pattern of a single slit the separation between the the first minimum on one side and the first minimum on the other side is 5.2 mm. The distance of the screen from the slit is 80.0 cm and the wavelength of the light used is 546 nm.

Calculate the width of the slit.

[4]

4 (a) (i) Define *power*.

(ii) Using the definition in (i) show that power, P, is given by $P = Fv$, where F is the force and v is the velocity.

[3]

(b) A metal block of mass 5 kg is inclined at an angle of 30°C to the horizontal. The block slides, from rest, down the plane a distance of 100 cm in 2.0 s.

(i) Sketch a free body diagram for the block.

(ii) Calculate the frictional force between the block and the plane when the block is sliding.

(iii) Calculate the work done by the block.

[7]