

NATIONAL UNIVERSITY OF LESOTHO
FACULTY OF EDUCATION
BED PRIMARY EXAMINATIONS
BEP 1312 PHYSICS FOR THE PRIMARY SCHOOL
JULY 2023

MARKS: 100

TIME: 3 HRS

INSTRUCTIONS:

- This paper consists of five questions.
- Answer any **four** questions.
- Each question carries 25 marks.
- A scientific calculator may be used.
- Answer each question on a new page.

Question 1

- a) Scientists have developed equations that describe the movement of objects such as objects moving with constant velocity or constant acceleration.

Explain the terms acceleration and constant acceleration. (3)

- b) A car runs with a constant velocity of 15 m/s for 300s and then accelerates uniformly to a velocity of 25 m/s over a period of 50s. The velocity is maintained for 200s before the car is brought to rest with uniform deceleration in 30s.

Draw a velocity-time graph to represent the journey described above. (5)

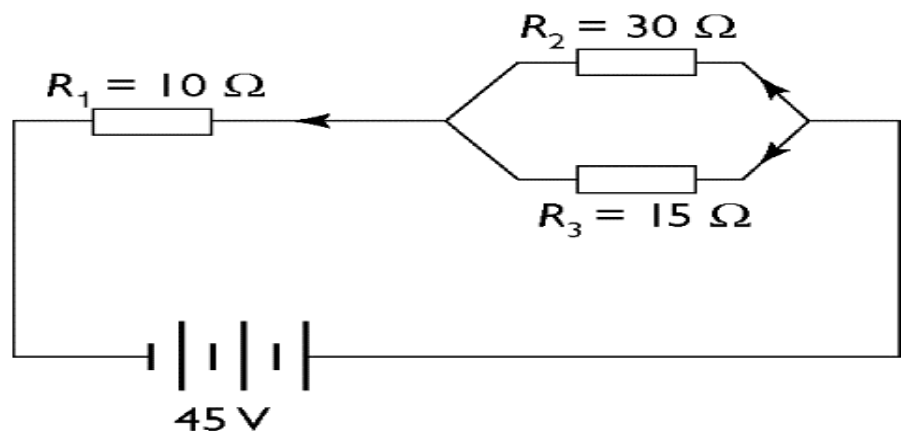
Use the graph to find the following:

- (i) The acceleration while the velocity changes from 15 m/s to 25 m/s. (2)
- (ii) The total distance travelled for the whole journey. (3)
- (iii) The average velocity for the whole journey. (3)
- c) A stone is thrown vertically upwards with an initial velocity of 30 m/s from the top of a 20 m high tower. Calculate
- (i) The maximum height reached by the stone from the top of the tower. (3)
- (ii) The time taken by the stone to reach the maximum height. (3)
- (iii) The total time taken by the stone to reach the ground. (3)

[25]

Question 2

- (a) Consider the electrical circuit below.



- (i) Calculate the effective resistance of this circuit. (6)
- (ii) Calculate the voltage across the 15 Ω resistor? (3)
- (iii) Calculate current that flows through the 30 Ω resistor? (3)

b) A steady current of 0.3 A passes through a lamp for 2 minutes. If the voltage supply is 6.0 V,

(i) Calculate the resistance of the lamp? (3)

(ii) Calculate the power dissipated in the lamp? (3)

(iii) Calculate the electrical energy that passes through the lamp? (3)

c) A consumer uses a 6 kW immersion heater, a 4 kW electric stove, and **three** 100 W lamps for 10 hours.

(i) Calculate the total power of the electrical appliances. (1)

(ii) Calculate the units (kWh) of electrical energy converted in the 10 hours. (3)

[25]

Question 3

a) Draw a neat and clearly labelled diagram to show how light is reflected on a plane mirror.

(5)

b) Define the following:

(i) Incident ray

(ii) Reflected ray

(iii) Angle of incidence

(iv) Angle of reflection

(v) Normal (10)

c) State the laws of reflection. (4)

d) Draw a ray diagram to represent the nature, position and relative size of the image

formed by a convex lens for the object placed at $2F_1$ (6)

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Question 4

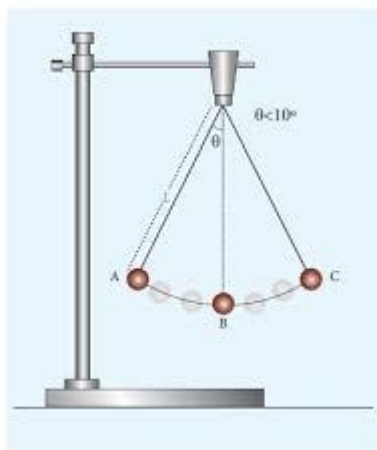
- a) Conduction is the transfer of thermal energy through a material from a region of high temperature to a region of low temperature.
Mention the **four** factors that affect the rate of heat transfer. (4)
- b) Describe any **five** applications of conduction (5)
- c) Water of mass 0.48 kg is increased in temperature by 0.7°C . the specific capacity of water is $4200\text{J/kg}^{\circ}\text{C}$. Calculate the amount of energy transferred to the water. (3)
- (d) A system of mass 4.5 Kg is heated from its initial temperature of 32°C to its final temperature of 65°C . If the total heat obtained by the system is 66.83 J, calculate the specific heat capacity of the system. (3)
- e) A thermos (vacuum) flask is a flask that keeps hot liquids hot and cold liquids cold for a longer time.
Describe how the design features of a vacuum flask make it efficient at keeping a hot liquid inside hot. (10)

[25]

Question 5

A simple pendulum consists of a pendulum bob suspended from a support by an inextensible string of negligible mass.

- a) Describe the **three** forces acting on the pendulum bob. (6)
- b) The diagram below shows a pendulum of amplitude 10° swinging from point A through point B to point C.



Determine the position (A, B, C or all the same), with an explanation, where the ...

- (i) Force of gravity is greatest?
 - (ii) Potential energy is greatest?
 - (iii) Kinetic energy is greatest?
 - (iv) Restoring force is greatest?
 - (v) Speed of the pendulum is greatest? (10)
- c) Describe how you would determine the period of a simple pendulum using a simple pendulum experiment. (3)
- d) The period of oscillation of a simple pendulum is 1.2 s. Taking $g = 9.8 \text{ m/s}^2$, calculate the length of the pendulum. (3)
- e) A simple pendulum has a length of 0.75 m. Calculate its period assuming 'g' to be 9.8 m/s^2 . (3)

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