School Name

Physics

General Instructions
- Reading time – 5 minutes
- Working time – 3 hours
- Write using black pen
- Draw diagrams using pencil
- Calculators approved by NESA may be used
- A data sheet, formulae sheet and Periodic Table are provided at the back of this paper

Total marks: 0

Section I – 20 marks (pages 2–24)
- Attempt Questions 1–20
- Allow about 35 minutes for this section

Section II – 80 marks (pages 17–36)
- Attempt Questions 21–35
- Allow about 2 hours and 25 minutes for this section

Section I

20 marks
Attempt Questions 1–20
Allow about 35 minutes for this section

Use the multiple-choice answer sheet for Questions 1–20.

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1   A marble is rolled off a horizontal bench and falls to the floor.

Rolling the marble at a slower speed would

A.   increase the range.

B.   decrease the range.

C.   increase the time of flight.

D.   decrease the time of flight.

2   A positively charged particle is moving at velocity, v, in an electric field as shown.

What is the direction of the force acting on the particle due to the electric field?

A.   Into the page

B.   Out of the page

C.   Up the page

D.   Down the page

3   Which of the following is NOT a fundamental particle in the Standard Model of matter?

    A.   Electron

    B.   Gluon

    C.   Muon

    D.   Proton

4   An astronaut is travelling towards Earth in a spaceship at $0.8c$. At regular intervals, a radio pulse is sent from the spaceship to an observer on Earth.

Which quantity would the astronaut and the observer measure to be the same?

    A.   Length of the spaceship

    B.   Speed of the radio pulses

    C.   Momentum of the astronaut

    D.   Time interval between the radio pulses

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2022 FINAL EXAMINATION

Physics

Section II Answer Booklet

80 marks
Attempt Questions 21–35
Allow about 2 hours and 25 minutes for this section

Instructions
- Write your Centre Number and Student Number at the top of this page.

- Answer the questions in the spaces provided. These spaces provide guidance for the expected length of response.

- Show all relevant working in questions involving calculations.

- Extra writing space is provided at the back of this booklet. If you use this space, clearly indicate which question you are answering.

Please turn over

Question 5 (4 marks)

A DC motor is constructed from a single loop of wire with dimensions 0.10 m. The magnetic field strength is 0.40 T and a current of 14 A flows through the loop.

(a) Calculate the magnitude of the maximum torque produced by the motor. **2**

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(b) Describe how the magnitude of the torque changes as the loop moves through half a rotation from the position shown. **2**

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Question 5 (continued)

How do the results from

Question 6 (0 marks)

Another question

Section II extra writing space

If you use this space, clearly indicate which question you are answering.

Section II extra writing space

If you use this space, clearly indicate which question you are answering.