

Candidate Name

Candidate Number

Centre Name

Centre Number

Paper 3: Physics

For Examination December 2023

(1.5 hours)

It is necessary to respond on the answer sheets provided alongside this question paper. Additionally, you must have a soft pencil (preferably of type B or HB), a clean eraser and a dark blue or black pen.

INSTRUCTIONS:

- You must write your name, candidate number, centre name and centre number on the answer sheets in the designated spaces.
- Attempt all the questions using a dark blue or black pen.
- It is important to follow the instructions provided on the answer sheets.
- Do not use correction fluid.
- Avoid writing on any bar codes.
- You are allowed to use a calculator if needed.

INFORMATION:

- This paper has a total of 40 marks.
- The number of marks assigned for every question or its parts is indicated within brackets []

Question 1 (20 marks)

Some substances are radioactive in nature, they may emit alpha, beta or gamma particles in certain situations. These substances are a vital part of nuclear energy and there is a fine line between balancing the benefits and risks of this technology.

Task: Write a coherent essay-length response that describes the scientific principles behind nuclear fission, binding energy and how they relate to nuclear ener

You should include in your essay: a. The process of nuclear fission and its role in nuclear power generation. b. How does the release of binding energy contribute to the sustainability and efficiency of nuclear reaction? c. Analyse and evaluate the chain reaction phenomenon in nuclear fission and its detrimental effects. Your response should also include diagrams, figures and equations where appropriate.

[illegible]

Question 2 (20 marks)

How do gravitational and electric fields interact with matter?

Task: Write a coherent essay-length response that describes the following points:

- (a) Explain how gravitational and electrical fields can influence the motion and behavior of objects.
- (b) Discuss the concepts of gravitational potential energy and electric potential, and their roles in determining the potential energy and forces experienced by objects in these fields.
- (c) Compare and contrast the fundamental properties, forces and equations associated with gravitational and electrical fields.
- (d) Highlight any unique characteristics or phenomena that arise exclusively in one field but not the other

Your response should also include diagrams, figures and equations where appropriate.

End of Paper