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Examiners' Report
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Pearson Edexcel International Advanced Level In Physics
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Introduction

The assessment structure of Unit 4: Further Mechanics, Fields and Particles is the same as that of Unit 5, consisting of Section A with ten multiple choice questions, and Section B with a number of short answer questions followed by some longer, structured questions based on contexts of varying familiarity.

This paper provided candidates of all abilities the opportunity to demonstrate their knowledge and understanding of Physics by applying it to a variety of contexts with differing levels of familiarity.

Candidates at the lower end of the ability spectrum were able to perform simple calculations involving substitution and basic rearrangement. However, they often struggled with multi-step calculations or those involving more complex concepts like trigonometry. Common mistakes included using diameter instead of radius.

Candidates should be encouraged to pause and review their work for such simple errors. Candidates at the lower end also had difficulty recalling specific terms, such as "thermionic emission." They should be encouraged to ensure they can explain common concepts, such as cyclotrons and linear accelerators, in a clear, step-by-step manner.

More able candidates generally excelled in mathematical problems but had difficulty explaining more complex concepts. Most candidates communicated their knowledge of Physics clearly, and answers were usually clear and unambiguous.

SECTION A: Multiple Choice Questions

In general candidates' performance in this section of the paper was similar to candidates' performance in previous series.

SECTION B: Extended Response Questions

Q11(a)

This question was generally well answered. Common reasons for marks not being awarded include omitting the idea of total momentum in MP1 and omitting to specify 'external' when stating that no resultant force acts in MP2.

Q11(b)

Both calculations were carried out well. In (i) the direction was sometimes stated ambiguously in MP4, and in (ii) a direct comparison was omitted in MP3.

Q12(a)

Most candidates were aware of what happens to the motion of the sphere after it is released, but sometimes essential detail was lacking from the explanation.

Q12(b)

This was well answered, with no particular problems seen in solutions to either calculation.

Q12(c)

Almost all responses seen for (i) had the arrows drawn correctly. Occasionally the direction of the forced was confused with the direction of motion.
Responses to (ii) usually identified the correct positions of maximum and minimum tension, although essential detail was not always given. Some responses identified centripetal force as an actual force acting on the sphere, rather than the resultant of weight and tension.

Q13(a)

This question was well answered. In (i) confusing labelling was sometimes seen with labelling of charges on the tubes sometimes contradicting labelling of the supply polarity.

Q13(b)

By and large candidates were able to give accurate responses to this question. In (i) symbols were accepted as well as particle names. In (ii) some responses missed out on a mark by referring to 'different' rather than 'opposite' charges. Annihilation was given by many candidates in (iii). Minor variations in the spelling of this term were allowed.

Q13(c)

The calculation in (i) was usually carried out correctly. Responses to (ii) sometimes contained only the first step in the calculation.

Q13(d)

This was generally well answered. In (i) it wasn't always clear that $\frac{2}{3}$ referred to the fraction of electronic charge. In (iii) the unit MeV/c^2 sometimes cause difficulty.

Q14(a)

This was well answered, although units were sometimes omitted for f. Candidates should be aware that the SI unit for frequency is Hz.

Q14(b)

Most candidates realised that they had to use an equation relating magnetic flux to flux density and area. Some managed to do this and obtain the correct answer for flux density, but others were confused as to how the number of turns affected the calculation.

Q14(c)

To obtain an answer within range, candidates needed to make accurate use of the graph. For most this was to determine the gradient of a tangent to the curve. Some used the equation $\varepsilon = BAN\omega$. Correct use of this equation would score full marks, although this equation is not included in the specification, so no "use of" credit could be given if this equation was used to produce an incorrect value (ignoring power of 10 errors)..

Q15(a)

This was generally poorly answered. Many responses indicated a general understanding of what is happening in the circuit, but with so little detail that marks could not be awarded.

Q15(b)

This question was well answered.

Q15(c)

Most candidates were aware of the process to be carried out in (i) to lead to a value for C. However, MP3 was often not awarded, as the response omitted to give a rearranged formula (or equivalent wording) that stated how a value for C is obtained from the gradient. In (ii), the "use of" the time constant equation was often shown, but an appropriate conclusion for MP3 was lacking.

Q16

This question presented candidates with a novel scenario that required careful reading and understanding before attempting a response. As a result, the best responses included a coherent and logically structed response. However, although many responses included isolated indicative content points, the idea of how the points linked together was often tenuous.

Q17(a)

'Thermionic' is a technical term that candidates should be aware of. Unlike 'annihilation' 'thermionic' is not particularly difficult to spell, and so accurate spelling of this term was required for the mark to be awarded.

Q17(b)

This calculation was well answered by most candidates.

Q17(c)

The calculations were correctly carried out by most candidates. In (ii) some responses attempted to "use" the given equation as $s = \frac{1}{2}at$, instead of $s = \frac{1}{2}at^2$.

Q17(d)

The vast majority of responses seen scored full marks for this question. Those responses that didn't score full marks sometimes drew (i) for (ii) and vice versa. Sometimes they drew the same path for both parts of the question.

Paper Summary

Based on their performance on this paper, candidates should:

- ensure they have a thorough knowledge of the physics for this unit.
- read the question carefully and answer what is asked.
- formulate a response that is consistent with the command word used in the question.
- be particularly careful to use appropriate scientific terminology in questions which ask for a description or explanation.
- include all substitutions and all stages in the working in ‘show that’ questions