



GCE AS EXAMINERS' REPORTS

**PHYSICS
AS**

SUMMER 2018

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PHYSICS
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COMPONENT 1

General comments

This was the second time that practical skills have been tested in a theory paper and it was found that the candidate's skills had improved significantly from last year, in particular regarding the calculation of percentage uncertainties. The risk assessment, however, was generally not well done.

The particles question (Question 5) was very well answered and there was a real improvement in the QER question. However, only a small number were accessed the top band.

It was really pleasing to see that very few questions were left blank and also that candidates didn't appear to have any issues with the time allocation for the exam.

Specific comments

Question 1

- (a) Generally well answered. Some irrelevant risk assessments were given for (a)(iii) such as the weight falling on a person's foot when the test was being taken on a bench.
- (b) This was poorly answered with a large proportion of the candidates describing ductile (crystalline) fracture rather than brittle fracture.

Question 2

This is the second year that uncertainties have been examined in a theory paper and as mentioned earlier there was a notable improvement in the way in which this question was answered

Question 3

Parts (a) (b) and (c)(i) and (ii) were generally well answered

- (c) (iii) This was not well answered. Many candidates just wrote the words 'friction' and 'air resistance' without stating on which part of the person / bike they were acting.
- (d) This also proved to be more discriminating than expected, although there were some very well argued examples.

Question 4

- (a) This was not well answered with a large number of candidates unable to convert the watt into base SI units.
- (b) Very well answered by the majority of candidates.

Question 5

- (a) [QER] Generally well answered with most candidates obtaining the middle band and it was pleasing to note that the majority of candidates had fully read the question and did attempt to answer all aspects.
- (b) This was one of the best-answered parts on the paper. Candidates are now, generally, much better at stating which conservation laws they are using and are able to put these down clearly.

Question 6

In part (a) a number of candidates described the centre of mass rather than the centre of gravity. The rest of the question was generally well answered.

Question 7

As anticipated this proved to be the most difficult question on the paper, in particular parts (b)(i) and (ii). These sections were answered correctly by a minority of candidates. It was, however, pleasing to note that the vast majority of candidates kept with the question and obtained full marks for (b)(iii).

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COMPONENT 2

General Comments:

All the candidates were able to gain marks on every question and as a consequence were able to demonstrate at least some knowledge of the principles learnt during the course. Questions 1, 2 and 6 were answered very well with most candidates able to gain high marks. The mathematical skills of the candidates were applied very well with some questions rewarding the more able candidates e.g. question 5 in using simple probability to determine the number of photons. Nearly all candidates were able to access the QER question 5(a) – some of them giving excellent answers and gaining full marks. Question 1(d) required an ethical judgement. Whilst some candidates provided vague and general answers, the more able candidates were able to provide a clear reason for the benefits to society.

Specific comments:

Question 1

- (a) A significant number of candidates were not able to give a clear definition of the progressive wave though many did refer to the fact that it can transfer energy without reference to the medium carrying the wave.
- (b)
 - (i) This part was well answered by all the candidates.
 - (ii) Many candidates were able to gain full marks. The common error was not being able to determine the wavelength correctly from the graph or the frequency.
- (c) This synoptic part used knowledge from Component 1 and many candidates were able to score full marks and dealt well with the SI prefixes used for the stress and the Young Modulus.
- (d) There were a number of vague answers given to this question. The majority referred to the fact that the information can be used to predict earthquakes but were not able to give specific reasons e.g. saving lives through enabling a quicker evacuation.

Question 2

- (a) The explanation of what is meant by a pd of 6V was not well understood by many candidates.
- (b)
 - (i) This was well-answered by the majority of candidates with the current being given to the correct number of decimal places.

- (ii) This was also well answered, though a common error was that candidates used the wrong values of resistors.
- (iii) Candidates were awarded a mark for an attempt to use a correct equation to determine the power.

Question 3

This question proved to be one of the most discriminating questions of the paper.

- (a)
 - (i) Most candidates were able to explain what is meant by the photoelectric effect.
 - (ii) Candidates were not able to express clearly the meaning of Einstein's photoelectric equation in terms of energy. They were not able to express that the remaining energy is maximum KE of the electron that is being emitted.

- (b) Only the more able candidates were able to describe all the modifications required for the circuit. Nearly all candidates referred to the fact that the voltmeter is connected incorrectly and should be in parallel as well stating there is no ammeter in the circuit. On the more able were to note that the polarity of the power supply / photo-cell is incorrect.

- (c)
 - (i) A number of candidates were not able to draw a good line of fit consistent with the data. Frequently the line was drawn the first and last data point and as a consequence the distribution of data points above and below the line was not good.
 - (ii) This part was not answered well and were not able to give to state that it is a straight line graph and that it passes close to the data points. The data for the graph was given in such a way that it would have been difficult to conclude that the line did or did not pass through the origin.
 - (iii) Most candidates were able to determine the gradient but did not indicate on the graph the data used by drawing a triangle that covers at least half of the graph line. Also many candidates did not state that the gradient is equal to the Planck constant.
 - (iv) This was answered well by all candidates with the majority determining the 5% of Planck constant and then being able to draw a valid conclusion by comparing their value with the range.

Question 4

- (a) This was generally answered well with the many candidates giving the correct definition of electric current.

- (b)
 - (i) Only the more able candidates were able to gain full marks for this part. Nearly all the candidates were able to state that the current is zero for the period 0 – 0.8 s. But frequently candidates were able to give a value for the current for the range 0.8 s – 1.0 s as well as stating that the current is zero for the time 1.0 s – 2.5 s.

- (ii) Many candidates did not draw a tangent to the graph for this part and simply determined the mean value of the current up to that point.

Question 5

- (a) This QER question was answered well and nearly all candidates made at least two valid points. Many did not draw a clearly labelled diagram to indicate the transition between the levels. Nearly all candidates were able to refer to the fact that population inversion is required and that this not possible with a 2 level system.
- (b)
 - (i) Many candidates were able to determine the energy but did not give the unit.
 - (ii) Only the more able candidates were able to use the simple probability of 1 in 500 photons in relation to the number of incident photons.

Question 6

- (a) Nearly all the candidates were able to determine the critical angle and angle A correctly and a majority went on to deduce that that the technician was not correct and made a valid conclusion based on their values
- (b) The more able candidates were able to determine the time correctly,
- (c)
 - (i) The vast majority of candidates were able to distinguish between monomode and multimode.
 - (ii) All candidates were able to gain marks on this part though the fact that it allows for a higher rate of data transfer was frequently omitted.



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