

Moderators' Report/  
Principal Moderator Feedback

January 2013

Principal Learning Engineering

EG308 Paper 01

Mathematical Techniques and  
Applications for Engineers

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## Unit EG308\_01

### Mathematical Techniques and Applications for Engineers

#### General comments

In the January 2013 paper, all tasks had a clear engineering context. This was a familiar style as used in previous examination series. From marking and feedback, it was clear that some candidates had prepared well for this paper, demonstrating confident working across the range of tasks. There were fewer mathematical errors seen in the candidate working with some evidence of checking and proving answers.

Following marking, each task has been reviewed to highlight good practice and some common errors. This review is useful for planning and preparing candidates for future examinations in this subject.

#### Question 1

**Q1(a):** This was generally answered well. Most candidates were able to correctly apply the laws of indices to obtain the correct answer.

**Q1(b):** Candidates are still having difficulty in transposing formulae. There were some examples of basic errors during the transposition process, although this question also proved to be very straightforward for some candidates.

**Q1(c) & (d):** The laws of logs were demonstrated by the majority of candidates. Only a minority attempted to solve by calculator. In (d) there was evidence of some clear and confident working.

#### Question 2

**Q2(a):** Most candidates plotted the points for the given data. The calculation of the gradient proved a problem for some candidates. The intercept had to be calculated in this task. Some candidates tried to extend the plotted line to the y axis and incorrectly stated the intercept. The law when obtained could have been checked from any value in the data, or on the graph. This would have confirmed the candidate answer as correct. This was rarely seen.

**Q2(b):** Many candidates managed to part factorise the formula, with some also identifying that this could be fully factorised using the difference of two squares method.

**Q2(c):** This problem could be solved using the quadratic formula, or by factorisation. Some basic errors were seen, for example stating the 60 and a positive rather than a negative value.

### Question 3

**Q3(a):** This task required the candidates to obtain two values by reading the tangent curve. Some candidates struggled to identify the two values of 45 and 225 degrees where the tangent value was equal to +1.

**Q3(b):** This question was generally answered well, with a minority of candidates demonstrating some basic errors in the use of Pythagoras theorem.

**Q3(c):** This problem was a straightforward cosine rule problem. However, many candidates did not attempt to solve it, or tried to solve it as a right angled triangle. Again, there was evidence of confident application of the cosine rule to correctly solve the problem.

### Question 4

**4(a):** There was some confident application of a range of techniques to correctly solve this task. However, many candidates were unable to work out the volume of the cam correctly and took the angle of 75 degrees as  $\frac{1}{4}$  of a circle. Some candidates used the formula provided, but left the angle in degrees instead of converting to radians.

**Q4(b):** Various techniques could be used to determine the diameter, which was obtained by many candidates.

### Question 5

**Q5(a-d):** Most candidates identified that the mode was in the 8 to 10V range. The true value could be obtained using the intersecting line method across the modal class. Some basic errors were seen when calculating the mean and for the cumulative frequency values.

### Question 6

**Q6(a) (i):** There were some tangent errors evident here, although the majority of candidates had drawn an accurate tangent on the graph.

**Q6(a) (ii):** There were some basic errors evident when the gradient was calculated. Some candidates missed out this task completely.

**Q6(b):** Again, this task was not attempted by many candidates. However, there was evidence of clear application of the differentiation technique required to solve this problem. Some candidates simply substituted the value of 8 into the original formula without attempting to differentiate.

**Q6(c):** There was evidence of some good working in this task. Some clear integration was seen. However, a large number of candidates missed the question out, or attempted to substitute the values into the equation without integrating the formula.

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