

**Section 1 (20 marks)**

Question	Definitive Mark	Comment
1. (a)	1/1	Correct statement provided.
(b)	2/2	Malleability accepted as this shows understanding.
2. (a)	2/2	Full marks awarded as the candidate explained the advantages of being able to disconnect and why it is better than a permanent connection.  This is very borderline for 2 marks as the explanation was not as clearly developed as the standard demands.
(b)	2/2	Correct explanation of increased energy/power use provided.
3.(a)	0/3	No understanding of function shown throughout the detailed answer. NB: At Higher, candidates should be able to show a basic understanding of the function required to allow analysis and calculation. A switch in an application and explanation of suitability for an application is also required.
4.	2/3	Three reasonable skills given (things an engineer does rather than knows). The candidate has misread the question as they gave two digital skills and one analogue skill. The question asks for three skills for one of the areas listed.
5.	4/4	Two reasonable role statements for engineer 1 and 2 provided. Engineer 1 clearly explained and the other (calculation of suitability for given loads) implied by the description the candidate gave of the role. Engineer 2 had two acceptable role statements given.  NB: Engineering branches and sub-branches are ever evolving and so cannot be definitive in an answer.
6.	2/3	5% subtracted rather than added.

**Section 2 (70 marks)**

Question	Definitive Mark	Comment
7. (a) (i)	3/3	Correct expression provided.
(a) (ii)	4/4	Correct conversion and simplification.
(b) (i)	2/2	Correct statement provided.
(b)(ii)	4/4	Correct disadvantage of comparator and choice of difference amp given. Explanation of reducing error for accurate positioning in this application.  NB: Full marks could have been awarded for the detailed explanation of why the comparator was unsuitable.
(c)	2/2	Clear explanation of Mark/Space ratio controlling speed provided.
8. (a)	3/4	First three marks gained but total load not divided by three to give load per metre.
(b) (i)	3/3	Correct working and answer provided.
(b)(ii)	2/3	Correct working using metres in intermediate steps. However, this was not correctly converted to M <sup>2</sup> .
(c)	4/5	Follow through error from (a) given full credit. Values then have to be worked through. 75% applied to Ee which is equally valid. Wrong height used.
9. (a)	3/3	Three acceptable benefit points given.
(b)(i)	0/2	Incorrect ratio used, no attempt made to calculate speed.
(b)(ii)	1/2	Understanding shown that voltage divider was 1.5k which is different from the 1 <sup>st</sup> value.
9.(c)	3/4	1500Ω value given in k Ω, Values should be given out by 1000. Everything else given as follow through errors.
(d)	4/4	Very good response gaining all 4 marks. This candidate has correctly interpreted what the question asked them to do with their op-amp knowledge.
(e)	4/5	Candidate used yield stress instead of UTS but you would expect a cable to stretch. Yield stress value was not accepted with the loss of only 1 mark due to follow through.
10. (a)	0/2	The candidate did not provided an explanation.
(b)	7/7	Very good description of circuit function.
(c)	0/3	
(d)	7/8	This is a good answer although Mark and Space increment/decrement are the wrong way around.
<b>al marks</b>	<b>71/90</b>	