Mark Scheme (Results)

June 2016

NQF BTEC Level 1/Level 2 Firsts in Engineering

Unit 9: Interpreting and Using Engineering Information (21174E)

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Question Number	Answer	Mark
1 (a)	A - Material and components C - Timings **Accept no variation.**	2

Question Number	Answer	Mark
1 (b)	**Mandatory sign name** **Mandatory Sign**   Wear head protection Wear ear protection Wear eye protection Wear foot protection Wear hand protection **Accept no variation.**	2

Question Number	Answer	Mark
1 (c)	A - Quality control	1

Question Number	Answer	Mark
1 (d)(i)	Award 1 mark for any of the following responses. Any **one** from: • Size/rod size (1) • Thickness/rod thickness (1) • Diameter/rod diameter (1) • Width (1) **Accept phonetic spelling.** **Accept no variation.**	1

Question Number	Answer	Mark
1 (d)(ii)	Award 1 mark for any of the following responses. • Allows the engineer to check the correct material is being used (1) • Allows appropriate tooling to be selected (1) • Allows correct speeds/feeds to be selected (1) • Allows correct welding/joining process to be selected (1) • Informs engineer of PPE/H&S requirements (1) **Accept any other appropriate response.** **Allow particular characteristics of a material such as properties and heat treatments if associated with bullet point 1, i.e. checking.**	1

Question Number	Answer	Mark
1 (e)	Award 1 mark for any of the following responses. • Manuals detail assembly sequences/procedures (1) • Manuals detail test requirements (1) • Manuals detail parts required (1) • Manuals detail specialist tools required (1) • Manuals detail PPE/H&S requirements during testing/assembly (1) • Manuals give information about how to produce parts correctly/to standard (1) **Accept any other appropriate response.**	1

Question Number	Answer	Mark
2 (a)	A - Milestones E – Start date **Accept no variation.**	2

Question Number	Answer	Mark
2 (b)(i)	B - Gantt	1

Question Number	Answer	Mark
2 (b)(ii)	C- Critical path analysis	1

Question Number	Answer	Mark
2 c	D - ICT system	1

Question Number	Answer	Mark
3 (a)	A linked response. Award 1 mark for identifying the advantage and 1 mark for the extension, up to a maximum of 2 marks. • It shows how long the engineer took to carry out the activity (1) allowing the organisation/engineer to cost the activity (1) • It gives information on the materials/tools/equipment used (1) allowing planning for future related activities (1) • It allows the total cost to be estimated/determined (1) allowing billing information to be generated for internal/external customers (1) • It allows tracking of the engineer's activities (1) allowing for data on maintenance, production and downtime to be analysed/gathered (1) **Accept any other appropriate response.**	2

Question Number	Answer	Mark
3 (b)	A linked response. Award 1 mark for identifying the advantage and 1 mark for the extension, up to a maximum of 4 marks. • It allows the engineer to review the performance of the engine (1) comparing it with the manufacturer's specification (1) • It contributes to the safe operation of the engine (1) ensuring safety of pilots/aircrew/passengers (1) • It provides an audit trail/record (1) which is an ISO/international requirement of airlines/accountability for the engineer (1) • It allows comparative data to be collated (1) as the test report can be compared with previous tests (1) • It can be used as part of an overall sign off/checking process (1) as the data from the test report can be used when checking other functions/scheduling further maintenance activity at a later period (1) • It contributes to giving the pilot authority to fly the plane (1) as all systems have to be signed off as tested before flight is allowed (1) **Accept any other appropriate response.**	4

Question Number	Answer	Mark
3 (c)	C - Operation sheets D - Weld procedure specifications **Accept no variation.**	2

Question Number	Answer	Mark
3 (d)	Award 1 mark for **each** of the following responses, up to a maximum of 2 marks. • To help identify which part(s) of the machine may be faulty (1) • To help identify components/tools that might be wearing/in need of replacement (1) • To determine whether the machine is in need of major repair or minor service (1) • To help determine the timing/frequency of maintenance required (1) • To allow a comparison of similar/identical machines (1) • To help determine whether problems occur due to operators or issues with the machine/activities (1) **Accept any other appropriate response.**	2

Question Number	Answer	Mark
4 (a)	Award 1 mark for **each** of the following responses, up to a maximum of 2 marks. • Large drawings will not fit in the filing cabinets unless folded carefully (1) • Drawings will become damaged/unreadable without the use of appropriate folding techniques (1) • If folded correctly drawings can be arranged in the filing cabinets systematically (1) • All drawings can be folded to result in an A4 size (1) • The resulting drawing opens and closes easier than other types of drawings (1) • After folding the drawing title/details always appear on the front (1) **Accept any other appropriate response.** **Do not accept 'easier to understand' without qualification.**	2

Question Number	Answer	Mark
4 (b)	A linked response. Award 1 mark for identifying the disadvantage and 1 mark for an extension, up to 2 marks for **each** response, up to a maximum of 4 marks. • Paper drawings may be obscured/damaged in a workshop (1) meaning drawings may be unreadable/ need to be reproduced (1) • Paper drawings can only be in one location in a workshop (1) meaning engineers have to move to access the information/operations can't run concurrently (1) • Paper drawings for one-offs allow/encourage annotation to the drawing (1) leading to misinterpretation when making spare parts (1) • Paper drawings may not be stored correctly in a workshop situation (1) which may result in degradation due to environmental contamination (1) • Paper drawings could be lost/misplaced in a complex car manufacturing environment (1) meaning spare parts may take longer/be more expensive to produce (1) **Accept any other appropriate response.**	4

Question Number	Answer	Mark
5 (a)(i)	Award 1 mark each for any of the following responses, up to a maximum of 2 marks. • Nuts • Bolts • Screws • Springs • Pins • Clips • Keys • Drive mechanisms • Rivet **Accept any other appropriate response.**	2

Question Number	Answer	Mark
5 (a)(ii)	Award 1 mark for any of the following responses. • Variable resistor • Adjustable resistor • Potentiometer **Accept any other appropriate response relating to a resistor that can be set to different values (do not accept "resistor" on its own).**	1

Question Number	Answer	Mark
5 (a)(iii)	A linked response. Award 1 mark for identifying the reason and 1 mark for the extension, up to a maximum of 2 marks. • All dimensions will be from one point (1) preventing incremental tolerance error (1) • Dimensions are easier to read (1) making marking out/machine programming more straightforward (1) • Fixed references help in geometric tolerancing (1) as the geometry is often related to a single position/datum (1) **Accept any other appropriate response.**	2

Question Number	Answer	Mark
5 (b)(i)	Award 1 mark for **each** of the following: Upper limit diameter = 25.4 (accept 25.40) Lower limit diameter = 24.6 (accept (24.60) **Accept no variation.**	2

Question Number	Answer	Mark
5 (b)(ii)	A linked response. Award 1 mark for identifying the reason and 1 mark for the extension, up to a maximum of 2 marks. • A geometric tolerance allows features to be specified (1) with reference to a fixed datum/ specific size/ another feature (1) • A geometric tolerance will allow the hole positions to be specified accurately (1) without having to add tolerances to every individual dimension (1) • Using a geometric tolerance saves time (1) as the position of a group of features can be specified with one tolerance (1) • Using a geometric tolerance is an efficient way of specifying features (1) as complicated notes/linear tolerances would otherwise have to be used (1) Allow any of the following as examples of geometric features (above): • Straightness • Flatness • Circularity • Cylindricity • Profile of line • Orientation of profile • Profile of surface • Orientation of any profile surface • Position • Orientation of position • Coaxiality • Symmetry • Parallelism • Perpendicularity • Angularity • Run out • Total run out • Maximum metal condition **Accept any other appropriate response.**	2

Question Number	Answer	Mark
6 (a)	A linked response. Award 1 mark for identifying the advantage and 1 mark for an extension, up to 2 marks for **each** response, up to a maximum of 4 marks. • Allows the sequence/location of assembly to be established (1) ensuring that parts are assembled correctly (1) • Allows bolt tightening torque/force to be stated (1) meaning all pumps are assembled to the same standard (1) • Shows which parts/where the grease should be applied (1) preventing damage when starting/running in (1) • Indicates the use of specialist tools (1) saving assembly time on the production line (1) • Allows rotation/movements checks (1) preventing incorrect assemblies from being packaged/shipped/moved to the next stage of assembly (1) • Indicates the test requirement of the pump following assembly (1) to ensure the pump meets its design specification/has been assembled correctly (1) • Indicates how far bushes should be inserted into bearings (1) to ensure consistent running of gears (1) • Provides additional/detailed information (1) allowing less chance of drawing misinterpretation (1). **Accept any other appropriate response.** **Do not accept generic responses associated with making notes.**	4

Question Number	Indicative content	Mark
6 (b)	**Positive implications/impact:** • The customer would get an idea of the appearance/layout of the specialist pump • The customer may be more likely to purchase the pump having seen the schematic diagram • The schematic diagram could be used in a manufacturer's manual to aid in servicing and repair • The schematic diagram can provide a 3D view of the assembly unlike conventional engineering drawings • The schematic diagram helps to show how the pump works, which may be useful when discussing with potential customers • Good annotation can lead to better understanding of the diagram. **Negative implications/impact:** • The schematic diagram is not necessarily checked for scale/proportion so may not be accurate • The schematic diagram may not give a true representation of the pump layout/appearance • The schematic diagram may be so complex that they cannot be understood by the intended audience • Cost implications in terms of training/time to produce detailed schematic drawings. **Model Answer** Pardpumps can use a schematic diagram in the information they show each customer so they can visualise how the pump works and how it is put together; however, details are not always easy to see from a schematic diagram, particularly for non-engineers. A schematic diagram could be useful if the customer purchases the specialist pump as it could be used in the manufacturer's manuals, as it would show users how the parts go together and can help in maintenance and repair. A schematic diagram is complex and time consuming to produce so may be wasted effort; in addition, it may not be in the right proportions and detail, so can be misleading. It also does not show how specific parts have to be assembled in great detail, so may be of limited value after the initial design phase. A schematic diagram can also be very complicated and thus difficult to understand, which could act as a disincentive to purchase.	8

Level	Descriptor	Marks
0 0 marks	No rewardable material	0
1 1-3 marks	A few key points identified**,** or one point described in some detail. The answer is likely to be in the form of a list. Only one viewpoint considered. Points made will be superficial/generic and not applied/directly linked to the impact of the organisation producing schematic diagrams for customers. The learner shows a limited understanding of schematic diagrams.	1-3
2 4-6 marks	Some points identified, **or** a few key points described. Consideration of more than one viewpoint but there will be more emphasis on one of them. The answer is unbalanced. Most points made will be relevant to the impact of the organisation producing schematic diagrams for customers. The learner shows a good understanding of schematic diagrams.	4-6
3 7-8 marks	Range of points described, **or** a few key points explained in depth. All sides of the case are considered and the answer is well balanced, giving weight to all viewpoints. The majority of points made will be relevant and there will be a clear link to the impact of the organisation producing schematic diagrams for customers. The learner shows a developed understanding of schematic diagrams.	7-8

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