Mark Scheme (Results)

January 2014

NQF BTEC Level 1/Level 2 Firsts in Engineering

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

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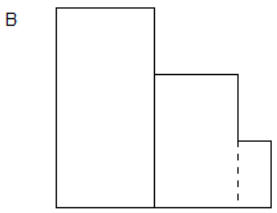
Question Number	Answer	Mark
1 (a)	B - Exploded diagram	1

Question Number	Answer	Mark
1 (b)	Award 1 mark for **each** drawing type matched to the correct application. Circuit diagram – Checking the layout of electronic components (1) Flow chart – Showing the sequence of production (1) **No mark awarded where two or more lines are drawn from a drawing type.**	2

Question Number	Answer	Mark
1 (c)(i)	Linetype B	1

Question Number	Answer	Mark
1 (c)(ii)	Award 1 mark for any of the following responses: Any **one** from: • Diameter/dia (1) • The size of the hole (1) **Accept all other appropriate interpretations of diameter.**	1

Question Number	Answer	Mark
1 (d)	Award 1 mark for **each** of the following responses, up to a maximum of 2 marks. • Not easy to read/can be confusing/not intuitive (1) • Too much information presented (1) • Training required in a number of drawing projections (1) • Does not show the object in 3D/ range of different views presented (1) **Accept any other appropriate response**	2

Question Number	Answer	Mark
1 (e)		1

Question Number	Answer	Mark
2 (a)(i)	Award 1 mark for any of the following responses: Any **one** from: • Risk/danger of explosion (1) • Explosive material (1) • Explosive (1) **Accept any other appropriate response.**	1

Question Number	Answer	Mark
2 (a)(ii)	Award 1 mark for **each** of the following responses, up to a maximum of 2 marks. • Wear gloves to protect hands (1) • Do not rub eyes after use (1) • Wash your hands after use (1) • Wear eye protection (1) • Replace lid immediately after use (1) • Wear face mask (1) • Wear protective apron/overall/clothing (1) • Handle with care (1) • Store in a safe place (1) **Accept any other appropriate response.**	2

Question Number	Answer	Mark
2 (b)	Award 1 mark for **each** of the following responses: A – Mechanical properties (1) D – Physical dimensions (1)	2

Question Number	Answer	Mark
3 (a)	A linked response, award 1 mark for identifying how and 1 mark for the extension, up to a maximum of 2 marks. • To schedule the assembly of bicycle parts (1) in order to meet deadlines (1) • To keep personnel on track (1) as they can be used in status reporting to show how much of the plan has been completed (1) • To provide a visual timeline for starting and finishing the bicycle assembly tasks (1) as it clearly shows the interrelationship between a number of tasks (1) • To plan each stage of manufacture (1) in order to complete the bicycle on time (1) • To show where stages of manufacture can overlap (1) to allow more than one activity to be undertaken at a given time (1) • To plan the ordering of parts (1) to allow for JIT production to be implemented (1) Do not accept "organise manufacture of a bicycle" without specific application and extension. **Accept any other appropriate response.**	2

Question Number	Answer	Mark
3 (b)	A linked response, award 1 mark for identifying the disadvantage and 1 mark for an extension, up to 2 marks for **each** response. • The charts can become very complex (1) so they require engineers to have detailed knowledge of manufacturing (1) • The length of bars only indicates time period to complete each task (unlike network analysis) (1) which means you cannot tell what level of resources are required for each task (1) • Very time consuming to produce (1) as any change to the schedule requires a redrawing of the chart (1) • Difficult to visualise on a single piece of paper (1) therefore difficult to show charts to an audience without breaking it into segments (1) • Has to be constantly updated (1) otherwise it will get ignored and serve no real purpose (1) • Spreadsheets/project management/software is complicated (1) so engineers may require additional training (1) **Accept any other appropriate response**	4

Question Number	Answer	Mark
3 (c)	Award 1 mark for any of the following responses: • 42 • 42 mm • 42 millimetres • Forty two • Forty two millimetres Accept misspellings.	1

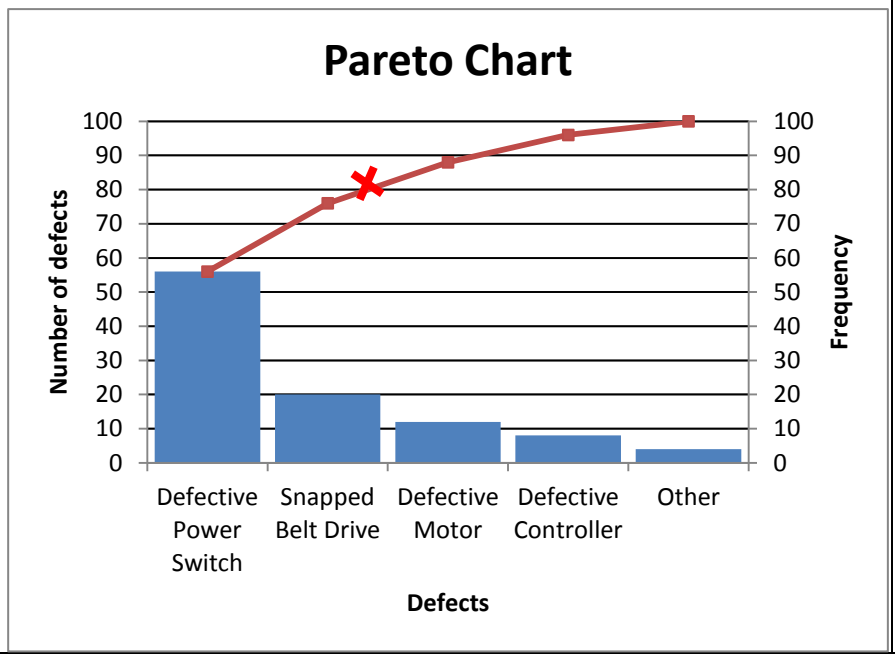
Question Number	Answer	Mark
3 (d) (i)	Award 1 mark for any of the following responses: • 5 • 5.0 • 5.00 • 5mm • Five millimetres Accept misspellings.	1

Question Number	Answer	Mark
3 (d) (ii)	Award 1 mark for **each** of the following responses, up to a maximum of 2 marks. • To ensure the screw will fit correctly (1) • So that the tap does not break (1) • So the thread is not truncated (1) • To avoid threads not being fully formed/so the thread is the correct depth (1) • To thread holes quickly/efficiently (1) Do not accept any response based on correct/incorrect drill size only or the depth of the hole only. **Accept any other appropriate response**	2

Question Number	Answer	Mark
4 (a)	Award 1 mark for **each** of the following responses: A – Scale/Ratio/Proportion (1) B – Materials/Metal (1) Accept misspellings.	2

Question Number	Answer	Mark
4 (b)	A linked response, award 1 mark for identifying the advantage and 1 mark for the extension, up to two marks for **each** response. • It provides a part number /part description of each part (1) so that the engineer is able to identify the correct part on the drawing (1) • It provides details of the materials being used (1) so that the engineer can request these prior to manufacture (1) • It shows the dimensional tolerances of the drawing (1) allowing the engineer to make the parts to the correct degree of accuracy (1) • It shows the units of measurement (1) allowing the engineer to ensure the correct sizes (1) • It shows the scale (1) allowing the engineer to use the drawing as a template to check the measurements of parts (1) • It enables consistency between drawings (1) which allows engineers to interpret the information more efficiently (1) • It ensures the drawing includes all necessary information (1) so all technical staff refer to it before ordering materials/planning production/making parts, etc. (1) • Much of the information can be repeated or easily edited on the template (1) so drawing time is reduced (1) • Establishes conventions that must be adhered to (1) allowing engineers to prepare, complete and amend drawings to a uniform standard (1) **Accept any other appropriate response**	4

Question Number	Answer	Mark
5 (a)(i)	Blank 1 (1) • 80 • Eighty Blank 2 (1) • 20 • Twenty	2

Question Number	Answer	Mark
5 (a)(ii)	1 mark for identifying the break point: • On the cumulative line between the points representing snapped belt drive and defective motor 	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. • Streamlines problem solving (1) as evidences the necessity to address defective parts in priority order (1) • Can clearly identify the major defects/significant few (1) allowing the company to focus attention on these issues (1) • Enables visual display (1) allowing management to communicate major defects/'significant few' to workers (1) **Accept any other appropriate response**	2

Question Number	Answer	Mark
5 (b)(i)	Award **two** marks for correct answer. 8107 minutes **Or** Award **one** mark for populating the MTTF equation correctly. (7833+8368+8120)/3 =	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. • Possible to predict when failure is likely to occur (1) so service intervals can address lifespan of parts (1) • Large amounts of data can be utilised in a short period of time (1) allowing service intervals to be adjusted quickly (1) • Easy to capture MTTF information during prototype testing (1) so planned maintenance intervals don't need to be adjusted when in service/safety factors can be calculated (1) • Allows treadmill to be removed from use at the appropriate time (1) to maximise capacity for customers (1) **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. • Able to generate inspection/testing records of manufactured products/finished components during production (1) to enable traceability, via auditable signatures, if a flat screen monitor component were to fail (1) • An ability to check pass/reject rates of flat screen monitor components (1) so that adjustments can be made to the flat screen monitor production processes to minimise waste (1) • Enables the goals and objectives set to be met (1) as production information will be available in the form of up-to-date data to support improved flat screen production processes/activities (1) • It will result in a focus on after sales service (1) rather than the detection of faulty monitors after they have been produced (1) • It will help to coordinate flat screen monitor production activities (1) including the use of materials/methods of manufacture/equipment from internal/external sources (1) • Improved company image/reputation (1) as documentation could form part of the company's ability to achieve BSI 9001 certification (1) • Keeping records will help company (1) as it can identify where problems in production occur (1) **Accept any other appropriate response**	4

Question Number	Indicative content	Mark
6 (b)	**Possible benefits** Switching to an ICT-based system could mean a much more efficient system in terms of work output. Drawings can be amended centrally and data can be accessed quickly. There may be long term cost benefits however the short term costs of purchasing software and system implementation needs careful consideration. **Possible benefits:** • Large amounts of data can be held on compact storage devices reducing the need for office space, rent or building purchases • Paperless system requiring less physical storage space requirements • Master drawing kept on file • If drawing requires amendment then the master is the only one that needs amending • Easy access to all users in the business • Easy to make amendments to drawings and documentation • Ease of transferring drawings to other companies/departments • Quick access to data • Secure file location with password protection • Easy to back up drawings and documentation • Cleaner and tidier working environment • Increase speed allowing tasks to be completed more quickly • Systems allows the company to respond to customers rapidly • Data held in digital format can be interrogated quickly and flexibly • Better quality information improving standards of decision making **Possible drawbacks:** • Set up costs are high with initial staff training and software costs • Updates are often required which can be costly in terms of time • Dependency on the ICT system meaning malfunction could create major problems • Limited by software, hardware and communication speeds of systems • Technological change can be costly in terms of updating software and hardware • Standards may change requiring software changes	8

	Model Answer XYZ Electricals may have a large quantity of drawings that take up quite a lot of floor space within the company. Accessing these drawings is time consuming even though there may be an organised filing system in place. Switching to an ICT-based system would allow faster access by typing in specific drawing numbers. This type of system would also allow engineers to amend a single drawing that can then be accessed by all other personnel. Access arrangements will be more secure as only a limited number of personnel will have security clearance to access and amend drawings. However, the company needs to consider the costs involved with implementing such a system as software and training will be expensive as too will the time requirements in inputting data/drawings. Although the long term benefits will allow faster responses to customers/clients as the efficiencies of the system should allow tasks to be completed to tighter deadlines. **Accept any other valid response.**	
Level	**Descriptor**	**Marks**
Level 0	No rewardable material.	0
Level 1	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 benefits of an ICT-based system of document control.	1-3
Level 2	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 benefits of an ICT-based system of document control but the link will not always be clear.	4-6
Level 3	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 benefits of an ICT-based system of document control.	7-8

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