

**Engineering**

General Certificate of Secondary Education

Unit **A622**: Engineering Processes

**Mark Scheme for January 2013**

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This mark scheme is published as an aid to teachers and students, to indicate the requirements of the examination. It shows the basis on which marks were awarded by examiners. It does not indicate the details of the discussions which took place at an examiners' meeting before marking commenced.

All examiners are instructed that alternative correct answers and unexpected approaches in candidates' scripts must be given marks that fairly reflect the relevant knowledge and skills demonstrated.

Mark schemes should be read in conjunction with the published question papers and the report on the examination.

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Question		Answer	Marks	Guidance
1	(a)	Automotive – Passenger airbag Computers, Communication and IT – Mobile telephone Chemical and Process – Varnish Rail and Marine – Signalling system  One mark for each correct link (4x1)	4	
	(b)	One mark for each <b>different</b> example of a product made in <b>two</b> of the given sectors No mark for naming sector  Examples: Automotive – Gearbox Computers, Communication and IT – Computer mouse Chemical and Process – Shampoo Rail and Marine – Passenger information system (2x1)	2	
	(c)	One mark for each <b>different</b> sector given  Aerospace; Electrical and Electronics; Medical and Pharmaceutical; Structural and Civil (2x1)	2	Sectors must be from the list given in the Specification.
2	(a)	One mark for each correctly identified process type  Case hardening – Heat and chemical treatment Chromium plating – Surface finishing Vacuum forming – Shaping and manipulation Welding – Joining and assembly (4x1)	4	
	(b)	One mark for each suitable item of PPE  Goggles/visor; apron/overalls; gloves; face/dust mask (2x1)	2	

Question			Answer	Marks	Guidance
3	(a)	(i)	GRP – composite	4	
		(ii)	Cast Iron/ stainless steel – ferrous metal		
		(iii)	Brass/zinc – non-ferrous metal		
		(iv)	ABS/polystyrene – polymer (4 x1)		
	(b)		A metal not containing iron	1	
	(c)	(i)	Explanation must contain reference to ‘mixture’ (1) and ‘metals’ (1). Reference to improving properties for application needed for third mark. (3x1)	3	Not simply mixture of ‘elements’
4	(a)		One mark for naming a component correctly Up to two marks for an adequate description of the component’s function	6	Allow reference to ‘protecting’ LEDs  Simplistic descriptions – one mark only
			<p><b>A</b> – Resistor – used to resist/control the flow of electricity in a circuit</p> <p><b>B</b> – Nyloc/self-locking nut – tightened onto a thread, the (nylon) insert stops it coming loose</p> <p><b>C</b> – Gears(train) – used to transmit power and change speed/direction of rotation in a driven system</p> <p><b>D</b> – 3-port valve – used in a pneumatic circuit to control the flow of air to a cylinder</p> <p><b>E</b> – Reservoir/air receiver – used to store air in a pneumatic circuit so that the circuit operates smoothly</p> <p><b>F</b> – LED – gives off light when a small electric current flows through it (2x(1+2))</p>		

Question		Answer	Marks	Guidance	
	(b)	<p>Up to two marks for a description of one benefit</p> <p>Examples:            They are cheaper to buy because they are mass-produced            No need for machines/workers to make them in the factory            Can standardise on assembly equipment            Consistent quality/accuracy            Can use all resources/time/workers for making the actual products they want</p>	2	Response <u>must</u> be qualified/justified for max. mark	
5	(a)	(i)	<p>No mark for naming product</p> <p>One mark for each of two specific processes appropriate to the product named            (2x1)</p>	2	<p>Processes may be either school or industry based</p> <p>Not generic statements such as 'material removal'</p>
		(ii)	<p>One mark for each of two tools or pieces of equipment appropriate to the product named            (2x1)</p>	2	<p>If industry based manufacture, tools/equipment must be appropriate to the processes used.            Do not accept 'components' as equipment.</p>
	(b)	<p>Up to three marks for a clear description of an appropriate quality control check – what and how</p> <p>Detail to include tools/equipment used to gain full marks</p> <p>Example:            Measure the diameter (1) of a component with a vernier caliper/micrometer (1) to check that it is the right size (1)            (3x1)</p>	3		

Question		Answer	Marks	Guidance
6	(a)	<p>Stages in manufacturing:-</p> <p><b>Design</b> Marketing <b>Production planning</b> <b>Material supply and control</b> <b>Processing and production</b> <b>Assembly and finishing</b> Packaging and dispatch</p> <p>(5x1)</p>	5	Allow reversal of <b>Production planning</b> and <b>Material supply and control</b> stages
	(b)	<p>Explanation must relate to the use of <b>modern</b> technologies and include reference to the monitoring procedure</p> <p>Example:- In CIE the system will be programmed to remove products at set/random intervals for checking. Robot arms remove products and manipulate them through checks/scanners. Results either accept or reject the product and cause any adjustments to be made automatically</p> <p>Detail/example required for full marks</p> <p>(3x1)</p>	3	

Question		Answer	Marks	Guidance
7	(a) (i)	<p>Up to two marks for an adequate description of one benefit to the workforce</p> <p>Examples:-            Less hard physical work to do            Computer controlled machines do repetitive work            Robots can work in hazardous conditions            Cleaner working environment</p> <p style="text-align: right;">(1+1)</p>	2	<p>Do not accept simplistic responses such as 'easier' or 'cleaner'</p> <p>Response must be qualified/justified for both marks</p>
	(ii)	<p>Up to three marks for an adequate explanation of potential benefits to the environment.</p> <p>Response may include reference to:            Recycling materials saving raw materials;            Recycling materials using less energy to produce;            New materials/processes producing less waste;            'Cleaner' manufacturing;            Less scrap means less waste/landfill;            End-of-life disposal of products has to be eco-friendly</p> <p style="text-align: right;">(3x1)</p>	3	<p>Simplistic statement(s) - maximum 2 marks</p> <p>Response must be qualified/justified for full marks</p>
	(b)	<p>Up to two marks for each adequate description of a cost factor to be considered.</p> <p>Examples:-            The cost is of new machinery may not be recovered for a long time            Changes to the factory layout would be expensive            Higher skilled staff need paying more            Workforce need to be trained for new procedures            New computer/control systems will be needed            Energy costs may increase</p> <p style="text-align: right;">2x(1+1)</p>	4	<p>Responses must be qualified/justified for both marks</p>

Question		Answer	Marks	Content	Guidance
					Levels of response
8*		Up to six marks for a discussion or critical evaluation of issues relating to the importance of quality control when manufacturing engineered products.	6	<p>Response may include reference to the following points:</p> <p>Without quality control there may be a lot of scrap produced costing time and money It makes sure the customers get a good product Saves time and materials when having to make more when some are wrong The company will get a good reputation if quality is always good Disposal of scrap is expensive Customers won't want to buy from companies producing poor quality products</p>	<p><b>Level 3 (5–6 marks)</b> Thorough analysis showing a clear understanding of the importance of quality control when manufacturing engineered products. Specialist terms will be used appropriately and correctly. The information will be presented in a structured format. The candidate can demonstrate the accurate use of spelling, punctuation and grammar.</p> <p><b>Level 2 (3–4 marks)</b> Adequate discussion showing an understanding of the importance of quality control when manufacturing engineered products. There will be some use of specialist terms, although these may not always be used appropriately. The information will be presented for the most part in a structured format. There may be occasional errors in spelling, punctuation and grammar.</p> <p><b>Level 1 (0–2 marks)</b> Basic discussion showing limited understanding of the importance of quality control when manufacturing engineered products. There will be little or no use of specialist terms. Answers may be ambiguous or disorganised. Errors of spelling, punctuation and grammar may be intrusive.</p>

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