

Engineering

General Certificate of Secondary Education

Unit **A624/02**: Impact of Modern Technologies on Engineering

Mark Scheme for June 2012

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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)	<p>Award 1 mark for each correct link shown:</p> <p>Aerospace to aircraft tyres Medical and Pharmaceutical with varifocal glasses Electrical and electronic with toaster Automotive to tow bar Chemical and Process with shampoo Computers, Communications and IT with wireless controller</p>	6	
	(b)	<p>Award 1 mark for each correct associated product in the chosen sector</p> <p>Aerospace – eg jet engines; landing gear; aircraft doors</p> <p>Medical and pharmaceutical – eg heart monitor; blood pressure monitor; wheelchairs</p> <p>Electrical & electronic – eg washing machines; hair dryers; digital clocks; digital cameras</p> <p>Automotive – eg laminated windscreen; windscreen washer / wiper; magnesium alloy wheels</p> <p>Chemical and Process – eg washing powder; cement; paint; wallpaper paste</p> <p>Computers, Communications and IT – eg laptop / desktop computer; memory stick; short wave radio; satellite TV</p> <p>(3 x 1)</p>	3	

Question		Answer	Marks	Guidance
2	(a)	<p>Award 1 mark for stating a benefit and an extra mark for how it has resulted in a wider range</p> <p>Examples: microchip technology has made products cheaper and more versatile quicker change over times means lots of slightly different products personalisation of items achieved through CNC and colours</p> <p style="text-align: right;">(2 x 2)</p>	4	Accept reference to robotics only if related to quicker/easier change-over.
	(b)	<p>Award 1 mark for each of two examples and up to two additional marks for description.</p> <p>Example: Improved energy efficiency through re-use of heat or materials has reduced the emissions More energy efficient factories, energy monitoring systems that turn off when not in use Use of modern fuels reducing waste More fuel efficient transport/ use of catalytic converters mean less pollution from transport delivering products</p>	4	

Question		Answer	Marks	Guidance
3	(a)	<u>Computer Aided Design</u>	1	
	(b)	Name two other pieces of drawing equipment you might use Tee Square; drawing board; set square; eraser; compass; spring bows; inking pen; board clips (2 x 1)	2	Accept any other reasoned response
	(c) (i)	Name one method of sharing computer files with engineering companies in different countries Remote servers; email; online storage; CD/DVD/memory card/pen drive	1	
	(ii)	Award up to two marks for an explanation of method identified in (i) Examples; Make a hard copy of the drawing and send by FAX Save onto a CD or a memory stick and send through normal post Send as an attachment to an e – mail Saved to storage area so company can retrieve.	2	
	(iii)	Award up to two marks for a relevant comparison Post vs email explaining benefits in terms of time, speed, cost Can make changes easily after sharing ideas with clients/others	2	

Question		Answer	Marks	Guidance
4	(a)	<p>One mark for each of two relevant benefits</p> <p>Don't have to check every part Takes less time than checking every part Gives you an idea of process output Cheap and easy to implement</p> <p style="text-align: right;">(2 x 1)</p>	2	
	(b)	<p>One mark for an example; one mark for description</p> <p style="text-align: right;">(1 + 1)</p>	2	Allow one mark only for description of sampling
	(c)	<p>Up to two marks for an adequate description</p> <p>When a problem is found, needs to be acted Fix problem/Make adjustments to improve</p>	2	

Question		Answer	Marks	Guidance
5	(a)	One mark each for light sensor and buzzer in correct places (1 + 1)	2	
	(b)	One mark for each of two correctly named sensor Heat sensor; proximity sensor; cameras; microphones; metal detectors(for food); positioning/alignment sensor (1 + 1)	2	Accept any other <i>appropriate</i> sensor
	(c)	Award one mark for an appropriate example and up to two further marks for a clear explanation Examples; Sensing components / finished products; Controlling conveyors and directing products to the correct packages Automatic QC/scrap rejection (3 x 1)	3	Example required for full marks.

Question		Answer	Marks	Guidance
6	(a)	<p>Award one mark for an appropriate safety procedure and an additional mark for a description/justification.</p> <p>Milling Ensure work piece is secure; ensure safety stops work; ensure area is clear; ensure machine has been maintained.</p> <p>Brazing Ensure components are in secure location; check equipment; ensure fire extinguishers are available; operator trained/experienced with equipment/process.</p> <p>Spray painting Ventilation is adequate; area clean; process controls in place; materials stored safely; no naked flames.</p> <p style="text-align: right;">3 x (1 + 1)</p>	6	NOT PPE in any example

Question		Answer	Marks	Guidance
7	(a)	<p>Award one mark for each correctly placed component.</p> <p>Electrical / Electronic – transistor; lamp Mechanical – sprocket; split pin Pneumatic/hydraulic – drain tap; flow control valve</p> <p style="text-align: right;">(6 x 1)</p>	6	
	(b)	<p>Award one mark for each of two common uses</p> <p>Examples: Lighting; heating; computer; alarm system; machinery</p> <p style="text-align: right;">(2 x 1)</p>	2	Accept any other appropriate use
	(c)	<p>Up to two marks for a clear explanation.</p> <p>Reservoir Function – to act as storage for fluid or gases in the system</p> <p>Cam Function – to convert radial motion into linear using a pusher rod</p> <p>Diode Function – allows current in one direction only</p>	2	One mark only for a simplistic description of function

Question		Answer	Marks	Content	Guidance
					Levels of response
8*		Award up to six marks for a discussion or critical evaluation of the impact that systems and control technology has had on the quality of engineering production.		<p>Examples and points could include:</p> <p>Monitoring the output of processes Greater control = better quality Less scrap produced in high volume production due to early detection Higher precision from machines Better control of environment leads to improved working conditions Allows removal of scrap/rejects automatically</p>	<p>Level 3 (5–6 marks) Candidates provide a thorough analysis and show a clear understanding of the required question material. Specialist language and terms would be used in the appropriate areas being discussed and the required information will be well structured in its presentation. Candidates will demonstrate an accurate level of spelling, punctuation and grammar</p> <p>Level 2 (3–4 marks) Candidate provides an adequate discussion which shows a reasonable level of understanding of the question material. There will be some evidence of the use of specialist language although not always in the appropriate areas being discussed. Information, for the most part, will be reasonably structured but, again, may contain occasional errors in spelling, punctuation and grammar.</p> <p>Level 1 (0–2 marks) Candidate provides a basic discussion which shows some understanding of the question material but uses little or no specialist language. Answers may well be ambiguous or disjointed. Contains obvious errors in spelling, punctuation and grammar.</p>
Total			6 60		

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