

Engineering

General Certificate of Secondary Education

Unit **A622/02**: Engineering Processes

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>Medical and Pharmaceutical to Inhaler Computers Communications and IT to Webcam Structural and Civil to Flood barrier Chemical and Process to Paint stripper. (4x1)</p>	4	
	(b)	<p>Award 1 mark for each of two different sectors from those above and award 1 mark for a correct product for each sector.</p> <p>Aerospace</p> <ul style="list-style-type: none"> • Aircraft wings • Jet airliner • Helicopter rotor blades • Jet engines. <p>Automotive</p> <ul style="list-style-type: none"> • Airbags • Inertia seat belts • Laminated glass windscreen • Alloy wheels. <p>Rail and Marine</p> <ul style="list-style-type: none"> • Passenger information systems • Electrified track • Life jacket • Lifeboat. <p>Electrical and electronic</p> <ul style="list-style-type: none"> • Electric toothbrush • Satellite navigation system • Radio controlled car • Television sets. 2 x (1+1) 	4	Do not reward repetition of products

Question		Answer	Marks	Guidance	
2	(a)	<ul style="list-style-type: none"> overalls safety goggles. <p style="text-align: right;">(1+1)</p>	2		
	(b)	<p>One mark for appropriate safety precaution named plus one additional mark for a description/justification</p> <p>Area should be well ventilated; make sure you don't touch the hot end; don't touch the iron onto anything flammable; check cable; lead free solder; low voltage; silicon cables</p> <p style="text-align: right;">2 x (1+1)</p>	4	Do not accept references to items of PPE	
	(c)	<p>One mark for each of two specific checks given</p> <p>Using a jig to check alignment of component parts; rule/tape measure to check final measurements against design specification; correct materials have been used; Touch test to check surface finish</p> <p style="text-align: right;">(1+1)</p>	2	Allow reference to 'Sampling'	
3	(a)	(i)	Phosphor bronze is an alloy.	1	
		(ii)	ABS is a polymer.	1	
		(iii)	Copper/Phosphor bronze is a non-ferrous metal.	1	Allow use of Phosphor Bronze as Alloy and Non-ferrous
		(iv)	Concrete is a composite.	1	
	(b)	An alloy is a metal that is made by mixing two or more metals to produce a metal with desirable characteristics.	(1+1)	2	Reference to improved properties/characteristics required for full marks
	(c)	Made of different materials to make a more desirable material.	(1+1)	2	Reference to improved properties/characteristics required for full marks

Question		Answer	Marks	Guidance
4	(a)	Design, marketing, production planning, material supply, processing, assembly, packaging and dispatch, disposal.	1	Do not accept reference to processes
	(b)	<p>Up to two marks for a description of one quality control technique</p> <p>Examples: Sampling - used to check the quality of one product within a set number eg 1 in 50 It takes less time than checking every product. CAD used to simulate production to check for faults Visual inspection to examine for faults/surfacefinish/quality Comparing to standards Action - to correct faults/problems</p>	2	<p>Allow reference to a specific QC check</p> <p>Description required for full marks</p>
	(c)	<p>One mark for each of two factors to consider</p> <p>Factors might include:</p> <p>Is the material compatible; what is the cost of the finishing process; will the product be damaged during the process; test a piece first; batch size, materials used, cost, training required for staff, equipment needed, health and safety, time taken for process, waste created; what product is used for; is corrosion protection needed</p> <p>(1+1)</p>	2	
	(d)	<p>One mark for each of two relevant benefits</p> <p>Benefits may include:</p> <p>less sick days; no legal proceedings or costs; less damage to assets; less lost production; better quality; fewer accidents; improved company reputation, improved workforce morale</p> <p>(1+1)</p>	2	

Question		Answer	Marks	Guidance
5	(a)	<p>Award one mark for a correct example of each of the listed engineering processes</p> <p>Examples:</p> <p>Joining - welding, soldering, brazing, glueing,</p> <p>Assembly - screwing together, riveting, push fit, clipping, 'pick and place'</p> <p>Heat treatment - hardening, tempering, quenching, annealing</p> <p>Chemical treatment - plating, painting, galvanising.</p> <p style="text-align: right;">(4x1)</p>	4	Accept any other appropriate process.

Question		Answer	Marks	Guidance
	(b) (i)	<p>One mark for example, one mark for benefit</p> <p>Examples</p> <p>Kevlar in stab proof vests prevents injury Pre-coated sheet metal saves production time/cost</p> <p>(1+1)</p>	2	
	(ii)	<p>One mark for example, one mark for benefit</p> <p>Examples</p> <p>Shape memory alloy - returns to original shape Thermochromic dyes - colour change related to temperature</p> <p>(1+1)</p>	2	
6	(a)	<p>No marks for choosing the components but award up to two marks for correct and detailed explanation of its function, and one further mark for a valid example</p> <p>Flow control valve Function – to regulate the flow of fluid Examples – central heating systems, fluid control systems.</p> <p>Light emitting diode LED Function – produces light from low voltage/current Examples include – traffic lights, TV's, car indicators, many electrical items.</p> <p>Cold Rivet Function – join two pieces of metal together Examples – ships, steam trains, bridges.</p>		

Question	Answer	Marks	Guidance
	<p>Potentiometer Function – a variable resistor that is used to control voltage levels in an electronic circuit; Examples include – potential divider; volume control; etc.</p> <p>Chain Drive Function – provide drive to a shaft via a sprocket Examples – bike wheels, motorbike, engines.</p> <p>Transistor Function – to amplify and switch electronic signals Examples – computers, sound systems, radios.</p> <p style="text-align: right;">3 x (2+1)</p>	9	Accept any other appropriate reasoned response for function

Question		Answer	Marks	Guidance
7	(a)	Material B.	1	
	(b)	<p>Award one mark for each of two correct reasons.</p> <p>Not easy to store Not easy to handle Not readily available</p> <p style="text-align: right;">(1+1)</p>	2	
	(c)	<p>Award up to three marks for valid reason stating key points</p> <p>Answers considering the value for money, ease of storage and availability.</p> <p>Answers must relate to the purchase in large quantity and storage considerations based upon numerical values in the table.</p>	3	

Question		Answer	Marks	Content	Guidance
					Levels of response
8*		Award up to six marks for discussion or critical evaluation of the impact that modern technology has had on working conditions.		<p>Examples and points could include:</p> <ul style="list-style-type: none"> • Quality should improve by using modern technology. Greater control of processes • If there is a problem, larger quantities will be affected because of higher production rates, although traceability will be easier • Rapid prototyping allows cheap representations of products to be made to check the quality of the products before production • Modern technologies can be more accurate than hand-made items in certain applications. 	<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 little understanding of the question material and uses little or no specialist language. Answers may well be ambiguous or disjointed. Contains obvious errors in spelling, punctuation and grammar.</p>
Total			60		

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