OCR
Oxford Cambridge and RSA

GCSE

Engineering

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

General Certificate of Secondary Education

Mark Scheme for June 2014

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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.

OCR will not enter into any discussion or correspondence in connection with this mark scheme.

These are the annotations, (including abbreviations), including those used in scoris, which are used when marking

Annotation	Meaning of annotation
BP	Blank Page – this annotation **must** be used on all blank pages within an answer booklet (structured or unstructured) and on each page of an additional object where there is no candidate response.

Question			Answer	Mark	Guidance
1	(a)		One mark for a correctly named engineering sector plus one mark for a relevant product. Sectors: Aerospace; Automotive; Chemical & Process; Computers, Communication and IT; Electrical & Electronics; Medical & Pharmaceutical; Rail & Marine; Structural & Civil Any appropriate product relevant to the named sector 3 x (1+1)	6	Sectors must be from the list in the specification Do not reward repetition of products
	(b)		No mark for naming product. One mark for naming the technology and a further mark for a description of its use (1+1)	2	
2	(a)		One mark for each correct example given. Examples: Ceramic - tungsten carbide; aluminium oxide; glass Composite - concrete; GRP; carbon fibre; MDF Ferrous metal - any steel; cast iron; wrought iron Non-ferrous metal - aluminium; brass; bronze; copper; duralumin; tin; lead Polymer - ABS; HIPS; PP; HDPE; PVC; (5x1)	5	Not 'Kevlar®' Not simply 'iron'
	(b)		Polymer	1	

Question			Answer	Mark	Guidance
3	(a)		One mark for each correctly named component Examples: Mechanical - bolt; nut, pop-rivet; circlip; cable-tie Electrical/electronic - fuse; resistor; IC chip; LED; LDR; PCB Pneumatic/hydraulic - cylinder; three-port valve; reservoir/air receiver/tank (5x1)	5	Accept any other correctly named component
	(b)		Up to three marks for a clear explanation. Explanation may refer to: Cheaper than making in-house; no need for extra machinery/trained workers; guaranteed quality; can use all space for making own products; standardised parts make for easier assembly; ready availability (3x1)	3	Do not reward single word responses Response must contain explanation/justification for full marks

Question			Answer	Mark	Guidance
4	(a)	(i)	One mark for each valid reason. Examples: It is light but relatively strong It can easily be formed into complex shapes It does not need surface finishing/ will not rust Easy to carry around as its light Can be recycled if it breaks (1+1)	2	Not simply 'cheap' / strong'
		(ii)	Die casting; Forging Up to three marks for a description of the process Example: Description must include reference to **casting** the product by pouring **molten** the metal into **mould**. A simple sketch illustrating the process can be rewarded. (3x1)	3	Credit can be given for reference to shell moulding or (box-less) sand casting.
	(b)		One mark for naming and one mark for describing a relevant safety precaution Examples: Wear (leather) gloves when handling hot items Wear goggles/visor to protect eyes against splashes Protective clothing - (leather) apron / heat proof suit/overalls Ensure fire blankets/extinguishers/water easily reached in case of accident Wear a face/breathing mask to prevent inhalation of chemical fumes (1+1)	2	

Question			Answer	Mark	Guidance
5	(a)		Normal use	1	
	(b)		Up to two marks for each **justified** reason Examples Large amount of heavy machining needed using a lot of power Heat treatment processes used that require use of gas/electricity Product could be heavy and need to be moved by machinery The product could take a long time to produce, using power all the time Complex process needing many parts/processes to make it 2 x (1+1)	4	Clarity of reasoning required for both marks
	(c)		Up to three marks for a detailed description of energy use Energy used in disassembly of product; energy used in safe disposal/incineration of waste; transportation to disposal sites (3x1)	3	Fully reasoned response linking disposal method to energy used required for full marks

Question			Answer	Mark	Guidance
6	(a)		One mark for each appropriate example of a process type Examples: Material removal - milling; turning; sawing; threading Shaping and manipulation - casting; injection moulding; forging; vacuum forming; bending; rolling Joining and assembly - soldering; welding; brazing; riveting; glueing Surface finishing - painting; plastic/powder coating; anodising; electro-plating; galvanising (7x1)	**7**	
	(b)		One mark for each of two safety precautions relevant to the chosen process. Examples Milling - ensure work is securely clamped Injection moulding - make sure guard is in place over mould Welding - keep work area clear of other people Painting - ensure adequate extraction/ventilation (1+1)	**2**	Both precautions must relate to the chosen process

Question			Answer	Mark	Guidance
7	(a)	(i)	**P**rogrammable **L**ogic **C**ontroller	1	
		(ii)	One mark for a suitable example and up to two further marks for a description of the use of the PLC Example: Controlling conveyors - sensors tell the PLC when an item is in position; the PLC can then control a machine to carry out a process on the item 1 + (2x1)	3	
	(b)		One mark for the technology used and one mark for an example Examples: Using emails to contact suppliers Using websites/internet to research materials/components Use of databases/spreadsheets for stock control Automated systems for checking material/component quality Bar codes / RFID for tracking/checking Computer automatically re-orders of stock when more is needed 2 x (1+1)	4	

Question			Answer	Marks	Guidance	
					Content	**Levels of response**
8*			Up to six marks for a discussion or critical evaluation of issues relating to the advantages and disadvantages of using modern technologies in communication.	**6**	Response may include reference to the following points: Advantages: Instant messaging Use of emails and Internet / websites Smart phones and tablets Can send any information / details by attaching to emails Video conferencing Skype Facebook / Twitter Disadvantages: Loss of personal contact Too much reliance on technology Need for constant/reliable power source Cost of continual upgrading Privacy problems with 'social' media	Level 3 (5 - 6 marks) Thorough analysis showing a clear understanding of the advantages and disadvantages of using modern technologies in communication. 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. Level 2 (3 - 4 marks) Adequate discussion showing an understanding of the advantages and disadvantages of using modern technologies in communication. 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. Level 1 (0 - 2 marks) Basic discussion showing limited understanding of the advantages and disadvantages of using modern technologies in communication. 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.
			Total for paper	**60**		

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