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 2017

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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.

MARK SCHEME

Question			Answer / Indicative Content	Mark	Guidance
1	(a)		One mark for each of two relevant examples in two chosen sectors. No marks for chosen sectors. Examples: **Aerospace** - plane wings; landing gear **Automotive** - car bodies; disc brakes **Chemical and Process** - paint; cement **Computers, Communication & IT** - monitor; keyboard **Electrical and Electronics** - washing machine; electric fire **Medical and Pharmaceutical** - heart monitor; wheelchair **Rail and Marine** - railway carriage; navigation system **Structural and Civil** - tunnels; roads (4x1)	**4**	Accept 'radio' in Computers, Communication & IT or Electrical and Electronics
	(b)		One mark for the technology used plus one mark for a suitable description of its use. Example: Cam machines (1) can be used to make products faster and more consistently (1) (2x1)	**2**	
2	(a)		One mark for each correct example Examples: **Ferrous metal -** iron; high speed steel; stainless steel **Non-ferrous metal –** copper; zinc; titanium; bronze **Polymer -** PVC; ABS; HIPS; polycarbonate (3x1)	**3**	
	(b)		One mark for an example plus up to two further marks for		

Question			Answer / Indicative Content	Mark	Guidance
			a suitable description Example; A composite material is made up of two or more materials (1) combined to make a material of more useful properties (1). GRP is strands of glass combined with polyester resin and is usually called fibre glass(1) (3x1)	**3**	
	(c)		Up to three marks for a detailed explanation. Example: Recycling materials helps the environment by saving on raw materials (1) and the energy needed to extract them (1). It also avoids the pollution and disruption to the landscape of mining/extraction (1) (3x1)	**3**	Response must relate directly to the environment
3	**(a)**	**(i)**	One mark for each of three correct answers Boring; drilling; milling; sawing; turning (3x1)	**3**	
		(ii)	One mark for each of two correct answers Casting; extrusion; forging; injection moulding (2x1)	**2**	
		(iii)	One mark for each of two correct answers Brazing, soldering; welding (2x1)	**2**	
	(b)		Up to two marks for a suitable description Example:		

Question			Answer / Indicative Content	Mark	Guidance
			Enclosed computer controlled machines (1) mean that workers are protected from flying swarf and cutting oils (1). Workers don't need to work in hazardous conditions (1) because robots can do much of the work (1). Automatic ventilation systems (1) use sensors to control air quality (1) to provide a cleaner working environment. (2x1)	**2**	
4	**(a)**	**(i)**	Pop rivet Self-tapping screw (2x1)	**2**	
		(ii)	Up to three marks for a description of a workable method Example: Drill correct size pilot hole for the screw (1) in one piece; drill clearance hole in second piece (1); put screw through the clearance hole and screw it into the pilot hole (1) to make its own thread. (3x1)	**3**	Accept use of the screw as a 'self-cutting' screw for one mark only.
	(b)		(single/double acting) cylinder; three/five port valve; flow control valve; reservoir; solenoid valve; pressure gauge	**1**	
5	**(a)**		Product **A**	**1**	
	(b)		Up to two marks for each of two feasible reasons Examples: Product B could be small / flat pack (1) and therefore many more of them could be taken in one lorry load (1) Product B could be made locally (1) and not use much energy in transporting it (1) Product A may be made abroad (1) and therefore use a lot		

Question			Answer / Indicative Content	Mark	Guidance
			of energy bringing it to the country (1) Product A may be very large (1) and need heavy vehicles using more energy (1) 2 x (2x1)	**4**	
	(c)		Up to three marks for a detailed and relevant explanation Example: Renewable energy sources do not use any fossil fuels (1) and this reduces the need for mining / excavation (1). Also renewable energy sources are 'clean' energy sources because they do not pollute the atmosphere (1) (3x1)	**3**	Response to be clear and justified for full marks
6	**(a)**		One mark for each of three valid processes Pressing / Presswork Water jet cutting Laser cutting (3x1)	**3**	
	(b)	**(i)**	One mark for each of two suitable finishes Galvanising; plastic / powder coating; paint; electroplating; oil blackening / blueing (2x1)	**2**	
		(ii)	Up to two marks for a suitable description of a valid / relevant precaution Example: Make sure that there is good ventilation (1) to prevent breathing in fumes (1) Wear goggles / visor (1) to prevent liquids splashing in		Simplistic responses, e.g.' Wear goggles and apron' one mark max.

Question			Answer / Indicative Content	Mark	Guidance
			eyes (1) (2x1)	**2**	
7	**(a)**		Up to two marks for each of two suitable descriptions Examples: CAD software can be used to produce design drawings (1) which can then be sent electronically to clients or other companies (1) CAD software can produce 3D images (1) which can be used in rapid prototyping to make models (1) 2 x (2x1)	**4**	Accept any valid use of CAD
	(b)		Up to two marks for each of two valid benefits Examples: Computer controlled machines can make products more quickly (1) and to a more consistent quality (1) Computer controlled machines can work 24/7 and don't need rests (1) so manufacturers can use them instead of workers and save money on wages (1) 2 x (2x1)	**4**	Suggested additions: Fewer errors Less waste Cost savings Simplistic responses 1 mark each.
	(c)		**C**omputer **I**ntegrated **E**ngineering	**1**	

Question			Answer	Marks	Guidance	
					Content	**Levels of response**
8*			Up to six marks for a discussion or detailed explanation of the impact on the environment of the manufacture of engineered products.		Response may include reference to: Air pollution from fumes caused by manufacturing processes such as plastics production. Many products are disposed of after use and fill up waste sites. Manufacturing uses a lot of energy which means power stations cause more pollution. Many raw materials have to be mined / extracted which disturbs the environment. Traffic congestion caused by lorries delivering products and materials. Manufacturing processes often use chemicals which can cause water pollution.	**Level 3 (5-6 marks)** Thorough explanation**,** showing a clear understanding of the impact on the environment of the manufacture of engineered products. Specialist terms and examples will be used appropriately and correctly. The information will be presented in a structured format. The candidate will demonstrate the accurate use of spelling, punctuation and grammar. **Level 2 (3-4 marks)** Adequate explanation, showing an average understanding of the impact on the environment of the manufacture of engineered products. There will be some use of specialist terms and examples, 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, grammar and punctuation. **Level 1 (1-2 marks)** Basic explanation, showing a limited understanding of impact on the environment of the manufacture of engineered products. There will be little or no use of specialist terms or examples. Answers may be ambiguous, disorganised or 'list like'. Errors of grammar, punctuation and spelling may be intrusive. 0 - a response not worthy of a mark. Add 'Seen' at end of response.

Question			Answer	Marks	Guidance	
					Content	Levels of response
				6		When marking 'Levels of response' questions, if answers are presented as a list of bullet points then award Level 1 maximum and specific mark, 1 or 2, dependent on quality of list. Do not apply ticks or annotations to 'Levels of response' questions. Mark these by reading all of the response, then decide on an appropriate level and a specific mark.
			Total marks for paper	**60**		

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