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 2015

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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.

Annotations

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.
TV	Too vague
REP	Repeat

Question			Answer	Mark	Guidance
1	(a)		One mark for each correctly named engineering sector Washing machine – Electrical and Electronics Emulsion paint – Chemical and Process Mobile phone – Computers, Communication and IT Wheelchair – Medical and Pharmaceutical Disc brake – Automotive (accept Aerospace) (5x1)	**5**	Sectors must be from the list
	(b)		No mark for naming product. One mark for naming the technology and a further mark for a description of its use. Examples: Washing machine - digital programmer Mobile phone – touchscreen Disc brake – ceramic disc pad (1+1)	**2**	

Question			Answer	Mark	Guidance
2	(a)	(i)	One mark for each of two correct materials Alloys – Bronze; cast iron; high speed steel; mild steel (2x1)	2	NOT Aluminium
		(ii)	One mark for each of two correct materials Polymers – ABS; HIPS; Nylon (2x1)	2	
		(iii)	Carbon fibre	1	
	(b)		One mark for an appropriate example plus a further mark for reference to 'no iron' (1+1)	2	

Question			Answer	Mark	Guidance
3	(a)	(i)	One mark for each of two appropriate finishes Examples: Lacquer/varnish Anodising Plastic/powder/dip coating Paint Polishing Engine turning (2x1)	2	Galvanising not accepted as being a 'suitable' finish
		(ii)	One mark for each of two appropriate precautions Examples: Ensure adequate ventilation/fume extraction Keep work area clear Know position of emergency equipment Be trained/experienced in the process Check working order of machine Guard/shield to prevent splashing onto skin/into eyes (2x1)	2	No marks for PPE
	(b)	(i)	Up to three marks for a clear explanation. Explanation may refer to: Individual designs can be cut without the need for expensive press tools; cleaner cut made than punching; changes to layout/sizes can be made easily; not usually large quantities of identical panels needed; safer for operator; less waste material produced (3x1)	3	Do not reward single word responses NOT quicker or more accurate Cheaper only if justified by scale of production Response must contain explanation/justification for full marks
		(ii)	Material removal	1	Only acceptable response

Question			Answer	Mark	Guidance
4	(a)		One mark for each correctly named component and type **A** – 3 port valve – Pneumatic/hydraulic **B** - Variable resistor/ potentiometer – Electrical/electronic **C** – Circlip/c-clip - Mechanical **D** – Self-tapping screw - Mechanical **E** – Resistor - Electrical/electronic **F** - Spring/locking washer - Mechanical **G** – Flow control valve - Pneumatic/hydraulic (6x1)	**6**	NOT just 'screw' Allow type if component is incorrectly /not named
	(b)		One mark for an example and up to two further marks for a clear explanation Example; A bolt is an example(1) of a pre-manufactured component as it is made by a specialist manufacturer(1) to standard sizes and is usually cheaper to buy than to make yourself(1) (3x1)	**3**	Example and justified explanation required for full marks

Question			Answer	Mark	Guidance
5	(a)		One mark for an appropriate thermoplastic material Examples: ABS; HIPS; PVC; Polycarbonate	1	Accept other appropriate thermoplastic – not Acrylic
	(b)		Injection moulding	1	Only acceptable response
	(c)		One mark for each of three valid benefits Examples: Changes to designs can be made easily Designs can be sent electronically to others Easy to import features into designs Designs can be easily saved without needing space for drawings 3D images/animations can be produced Able to be sent to CAM machines for prototyping/making (3x1)	3	Accept quicker to produce but not more accurate
	(d)		Up to three marks for a detailed description of the application of a modern technology to the making of prototypes. Explanation may include reference to: Use of CAD software(1) to develop design/produce 3D image; linking CAD design to CAM to produce 3D model(1); type of CAM machine used (rapid prototyping/CNC router/3D printer)(1) (3x1)	3	Accept reference to CNC produced mould for vacuum forming the prototype. Fully justified response required for full marks

Question			Answer	Mark	Guidance
6	(a)		Up to three marks for an explanation of risk assessment Explanation must include reference to: • Identifying potential risks/hazards • Evaluating size of risk/frequency of possible occurrence • Actions taken to minimise risk (3x1)	3	Response to address all three points for full marks
	(b)		Up to two marks for a description of one benefit Examples: Reduces the likelihood of accidents(1) that would result in fines/loss of production(1) Improve company reputation(1) good safety record(1) Reduce compensation payments(1) to injured workers(1) (1+1)	2	Justified response required for full marks
	(c)		One mark for an appropriate example of a modern technology and up to two further marks for an explanation. Examples: The use of robots(1) to work in hazardous conditions(1) has improved conditions as workers don't have to do those jobs anymore(1) Temperature monitoring(1) by sensors improving air conditioning/ventilation(1) and making workers more comfortable(1) Use of machine sensors(1) to make automatic shut off(1) in the event of problems/danger(1) 1+(2x1)	3	Justified response required for full marks

Question			Answer	Mark	Guidance
7	(a)		Up to two marks for an adequate description of the use of a modern technology Examples: Research – Use of Internet/email(1) to find information/examples to inform design(1) Materials – Smart materials like thermochromic inks(1) allow products to be made that react to conditions such as heat or light(1) Automation – CIE(1) makes it possible to link all parts of a manufacturing system by computer to ensure that all operations run smoothly(1) Systems and control – PLCs/sensors(1) to control operation of machines(1) 2 x (1+1)	4	The modern technology used must be referenced for full marks Unjustified reference to CAD/CAM not accepted
	(b)		One mark for an example and up to two marks for an explanation of the use of the technology Examples: Use of CAD(1) to produce and develop ideas(1) and share electronically/by email(1) with clients. 1+ (1+1)	3	

Question			Answer	Marks	Guidance	
					Content	Levels of response
8*			Up to six marks for a discussion or critical evaluation of the benefits to the environment of recycling used engineered products.		Response may include reference to the following points: Reducing the need for new raw materials. Avoids damage to the environment caused by extraction of raw materials. Reduces energy consumption for materials processing. Allows dangerous materials/chemicals to be removed safely. Reducing the amount of waste going to landfill. Allows expensive components to be reused. Cuts down air pollution from waste disposal Reduce transport emmisions from taking products to landfill	Level 3 (5 - 6 marks) Thorough analysis showing a clear understanding of the benefits to the environment of recycling used 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. Level 2 (3 - 4 marks) Adequate discussion showing an understanding of the benefits to the environment of recycling used 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. Level 1 (1 - 2 marks) Basic discussion showing limited understanding of the benefits to the environment of recycling used engineered products.

Question			Answer	Marks	Guidance	
					Content	Levels of response
				6		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. 0 = a response not worthy of a mark.
			Total for paper	**60**		

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