RECOGNISING ACHIEVEMENT

GCSE

Engineering

General Certificate of Secondary Education

Unit **A622:** Engineering Processes

Mark Scheme for June 2011

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Question			Expected Answer	Mark	Rationale/Additional Guidance
1	(a)		**Engineering sectors produce different products** **Complete the links below to identify which engineering sector makes the products listed.** ***Award 1 mark for each correct link shown:*** Medical and Pharmaceutical to Blister packs Computers Communications and IT to Portable data storage Structural and Civil to Football Stadium Chemical and Process to Non–Drip Paints	**[4]**	
1	(b)		**State two engineering sectors different to those shown above. Name one product made in each sector.** ***Award 1 mark for each of two sectors different from those above and award 1 mark for a correct product for each sector.*** **Aerospace** • Aircraft wings • Jet airliner • Helicopter rotor blades • Jet engines **Automotive** • Airbags • Inertia seat belts • Laminated glass windscreen • Alloy wheels **Rail and Marine** • Passenger information systems • Electrified track • Life jacket • Lifeboat		

Question			Expected Answer	Mark	Rationale/Additional Guidance
			Electrical and electronic • Electric toothbrush • Satellite navigation system • Radio controlled car • Television sets 2 x 2	**[4]**	

Question			Expected Answer	Mark	Rationale/Additional Guidance
2	(a)		**Tick (✓) two items of personal protective equipment (PPE) that you should use when operating a grinding machine** • overalls • safety visor	**[2]**	
2	(b)		**Describe two safety precautions other than PPE that you should take when operating a grinding machine** ***Award one mark for each of two correctly named safety precautions when using a grinding machine including why or how.*** ***Examples*** Make sure you know the where the main cut off switch/main isolator is located [1] before you start work [1] Ensure that you have been correctly trained to use the equipment [1] so that you work safely [1] Make sure that any safety guards [1] (where fitted) are in place [1] Clamp work [1] to prevent movement [1] 2 x 2	**[4]**	

Question			Expected Answer	Mark	Rationale/Additional Guidance
2	(c)		**It is important to ensure that a finished product meets the design specification.** **Give two checks that would be made on a finished product to ensure that it meets the design specification** ***Award one mark for each description of a method used for checking accuracy of a finished product.*** Using a jig, check alignment of component parts, check final measurements against design specification, ensure correct materials have been used. 2 x 1	**[2]**	Do not accept tolerance unless qualified

Question			Expected Answer	Mark	Rationale/Additional Guidance
3	(a)		**Select a suitable material from the list to complete the following statements correctly.** Materials can be used more than once **(i)** brass duralumin and medium carbon steel are an alloy **(ii)** PVC is a polymer **(iii)** medium carbon steel is ferrous material **(iv)** duralumin is a non-ferrous material **(v)** MDF is a composite material.	**[5]**	(iv) accept anything from the list other than medium carbon steel
3	(b)		**State what is meant by the term 'ferrous.'** These are metals which contain **iron**. They may also have small amounts of other metals or other elements added, to give the required properties.	**[1]**	
3	(c)		**Name two ferrous metals, other than the one named in part (a) that are commonly used in the engineering industry** ***Award 1 mark for each correctly named material.*** Low carbon steel, mild steel, high carbon steel, high tensile steel, high speed steel, cast iron, stainless steel 2 x 1	**[2]**	Accept steel without qualifier

Question			Expected Answer	Mark	Rationale/Additional Guidance
4	(a)		**Robotic technology is increasingly being used by engineering industries.** **Give one example of an engineered product that is produced using robots.** ***Award one mark for a typical modern product that uses robots in the large scale production of engineered products.*** ***Examples*** motor vehicles, domestic washing machines/dryers, televisions, circuit board	**[1]**	
4	(b)		**Describe one way in which robots are commonly used when making an engineered product.** ***Award one mark for each correct and valid description.*** ***Examples*** Spot welding of body panels, transportation of component parts to assembly area, pick and place of electrical/electronic components	**[2]**	

Question			Expected Answer	Mark	Rationale/Additional Guidance
4	(c)		**Give two benefits to an engineering company of using robotics when making an engineered product.** ***Award one mark for each advantage of using robotics.*** Consistency of finished product, can operate in hazardous environments , more reliable than humans , are faster than humans , flexibility (can be easily re-programmed for a different task) continuous running 2 x 1	**[2]**	
4	(d)		**Give two disadvantages to an engineering company using robotics when making an engineered product.** ***Award one mark for each disadvantage.*** Possible high initial/set-up/training costs , set-up time , needs skilled operatives to programme the robots , extra space needed, redundancy / loss of jobs 2 x 1	**[2]**	

Question			Expected Answer	Mark	Rationale/Additional Guidance
5	(a)		**Complete the table below by giving two examples of each of the engineering process listed.** Award one mark for a correct example of each of the listed engineering processes eg, Shaping and manipulation: bending, folding, hammering, forging, twisting, casting, pressing, stamping, wire-drawing, vacuum forming, injection moulding, extrusion Surface finishing: grinding, polishing, blueing, coating, burnishing, painting. 2 x 2	**[2]** **[2]**	
5	(b)		**Describe two benefits of using Information, communication and digital technologies in the supply of engineering components** Award one mark for the benefit and a second mark for description of benefit **Example** Components/products are bar coded [1] enabling them to be tracked [1] **Other benefits** Components can more easily be located Stock can be re-ordered automatically Less manpower is needed Data can be easily transferred between departments	**[4]**	

Question			Expected Answer	Mark	Rationale/Additional Guidance
6			**Explain the function of any three engineering components listed below** 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: **Filter** **Function** – used to remove impurities/solids from a liquid or a gas in a hydraulic or pneumatic system [2] **Examples** include – air filters, fuel filters **Light dependent resistor LDR** **Function** – a semi conductor device whose specific resistance changes when exposed to a light source, [2] **Examples** include – automatic switching of street lights, security lighting **Potentiometer** **Function** – a variable resistor that is used to control voltage levels in an electronic circuit [2] **Examples** include – potential divider, volume control **Pop rivet** **Function** – used to secure two metal panels together [2] **Examples** include – commercial vehicle body panels, aircraft body/wing panels **Single acting cylinder** **Function** – uses air/liquid pressure to move a piston in one direction, return is by spring [2] **Examples** include – hydraulic rams, pneumatic brakes **Spring** **Function** – to provide tensile or compressive force in a mechanical system [2]		The function described can be different to the example given

Question			Expected Answer	Mark	Rationale/Additional Guidance
			Examples include – clockwork mechanisms, closing mechanism on a gate, valve spring in an internal combustion engine, return spring in a ballpoint pen	**[9]**	

Question			Expected Answer	Mark	Rationale/Additional Guidance
7	(a)		**State which material is the safest to use.** Material D	**[1]**	
7	(b)		**Give two reasons why material B would be best suited for the manufacture of a prototype product.** ***Award one mark for each of two correct reasons.*** Good value for money Easy to handle Readily available 2 x 1	**[2]**	
7	(c)		**Explain how the information in the able could be used to identify the best material for the workforce to use.** ***Award up to three marks for explanation any reference to using the table award one mark*** Explanation must include reference to the data in the table and the work force. Maximum of two marks if only a list of factors is given.	**[3]**	Do not award marks for value for money or availability

Question			Expected Answer	Mark	Rationale/Additional Guidance
8*			**Discuss the impact of modern technology on the range of engineered products available** Six marks for a discussion or critical evaluation of relevant implications. Examples and points could include: • New products contain microprocessors which can be readily programmed to provide a wide range of functions. Examples include - digital cameras, (although they basically look alike, they can perform different functions), IPods. • Products can be ordered over the internet and so can be accessed worldwide eg, games consoles and the like. • CAD is now widely used in the design of products which allows for swift modification/change of product design giving a wider range eg, left hand drive cars for the UK market. The above list is not exhaustive. **QWC** **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. **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.		

Question			Expected Answer	Mark	Rationale/Additional Guidance
			Information, for the most part, will be reasonably structured but, again, may contain occasional errors in spelling, punctuation and grammar. **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.	**[6]**	
			Total	**[60]**	

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