

Mark Scheme (Results)

Summer 2012

GCE Design and Technology
Product Design (6RM03)

Paper 01: Designing for the Future
(RMT)

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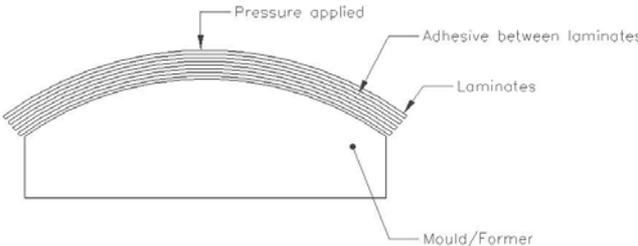
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Question Number	Answer	Mark
1(a)	<ul style="list-style-type: none"> • Laminated arch has good strength/strength to weight (1) • The size (length/width) of the beams is not limited by the size of the timber available (1) • The curve is easier to create (1) • Natural faults in the timber can be removed (1) • The process is repeatable once the mould/former has been produced (1) • The grain in the laminates all runs the same direction decreasing short grain (1) • Laminated timbers are less prone to warping/twisting/splitting (1) 	(3)
1(b)	<div style="text-align: center;">  </div> <ul style="list-style-type: none"> • Mould/former (1) • Adhesive (1) • Pressure (1) • Laminates (1) <p>0 marks for examples where the answer is simply bending a piece of plywood around a former = 0 marks for examples of steam bending a single piece of wood 0 marks to be awarded if the answer simply mentions glue and nothing else</p>	(3)
1(c)	<ul style="list-style-type: none"> • Taller trees (1) therefore longer sections available (1) • Fewer natural faults (eg knots/branches) in the timber (1) therefore less timber needs removing during preparation saving material and time costs/reduced weaknesses (1) • Increased resistance to rot/pests/disease (1) therefore less cost involved in treating the timber (1) / therefore reduced need to repair/replace timbers/increased durability (1) / increased yield (1) • Quicker growing trees (1) therefore timber could be used from a more sustainable/cheaper/plentiful source (1) • Timber with greater flexibility (1) which allows bends 	

	<p>to be made more easily/with less cracking (1)</p> <ul style="list-style-type: none">• Timber with better compression properties (1) which increases the strength /allows less timber to be used (1)• A range of colours can be genetically engineered into the timber (1) Reducing the need for artificial colouring (1)• Reduced lignin content (1) reduces the need for chemical processing (1)	(4)
	Total for question	(10)

Question Number	Answer	Mark
2(a)	<ul style="list-style-type: none"> • It gives a full and instant account of all transactions/stock levels (1) • It gives the means to monitor on a daily basis, the performance/popularity/demand of all products (1) • Ensure stock is reordered before it runs out (1) • Ensure over stocking does not happen (1) • Prevents unnecessary capital being tied up (1) • It provides data which can be automatically loaded into financial analysis spreadsheets (1) • EPOS reduces the time between order and receipt of a product (1) • Reduced human error (1) • Reduced labour force/cost (1) 	(2)
2(b)	<p>Advantages</p> <ul style="list-style-type: none"> • Reduces the need for large costly storage areas/stock pile (1) • Production lines can be balanced more efficiently (1) • Resources are in the right place at the right time (1) • Reduces the movement/transport of materials (1) • Enables quick response manufacturing (QRM)/shows buying trends (1) • Reduces labour costs (1) • An electronic inventory is automatically generated for record keeping purposes/no human error (1) • Never run out of stock (1) • Less waste (1) • Stock only ordered/delivered as necessary (1) <p>Disadvantages</p> <ul style="list-style-type: none"> • Set up costs are high (1) • Staff training/retraining has a cost implication (1) • The system is dependent on efficient material delivery (1) • Increases unemployment (1) <p>Do NOT award marks for descriptions about JIT, which are not related to Automated Stock Control</p> <p><i>[Maximum of 5 marks if only Advantages or Disadvantages are given]</i></p>	(6)
Total for question		(8)

Question Number	Answer	Mark
3(a)	<ul style="list-style-type: none"> • Repetitive accuracy (1) • The ability to save and reload the CAD drawings to suit demand (1) • The ability to machine extremely intricate/complex/accurate/quality/precise shapes (1) • The speed of production (1) • Reduced labour cost in terms of machine minders rather than skilled machinists (1) • Increased safety (1) • Continuous production/24-7 (1) • Reduced human error/less waste (1) 	(4)
3(b)	<p>Points</p> <ul style="list-style-type: none"> • Right first time (1) • Quick to respond to demand/trends (1) • High quality product(1) • Increasing quality of products (1) • Teamwork (1) • Multi-skilled/multi-disciplined workforce (1) <p>Justifications</p> <ul style="list-style-type: none"> • Reduces/saves money (1) • Saves time/reduces delays (1) • Customer satisfaction (1) • Flexibility (1) • No redesign necessary (1) <p><i>[Maximum of 3 Points. Maximum of 3 Justifications]</i></p>	(6)
Total for question		(10)

Question Number	Answer	Mark
4(a)	<ul style="list-style-type: none"> • It is the use of anthropometric data/human measurement to aid the design process (1) • It is the science of designing products for human use/interaction (1) • Its application makes the products easier to use (1) • Its application makes the products comfortable (1) • Its application makes the products safer/safe (1) • When applied to the workplace it can improve productivity (1) • Reduce RSI (1) • Designers generally design for 5th to 95th percentile/majority of the public 	(4)
4(b)	<ul style="list-style-type: none"> • The keys/features are positioned for maximum comfort (1) therefore the keyboard can be used for longer/reducing repetitive strain injury (1) • The keyboard is laid out so minimum movement is required (1) therefore making it more efficient (time-wise) to use (1) • The styling of the keyboard is new/radical/fun/interesting (1) often attracting customers to things which are new/different from the 'norm' (1) 	(4)
4(c)	<ul style="list-style-type: none"> • The layout of the keyboard is different to the more traditional one (1) therefore requiring a degree of retraining/practice/time to get used to/wasted time (1) • The ergonomic keyboard will be made in smaller quantities (1) therefore increasing the relative cost (1) • People are often wary of change (1) therefore making it more difficult (at least initially) to sell (1) • The aesthetics of the keyboard are different/unusual/unfamiliar (1) therefore may put people off (1) • The keyboard is larger (1) therefore requires more space/desk space (1) • More material is used (1) therefore increased cost (1) • Not possible/easy for one-handed use (1) therefore less suitable for disabled people/use with a mouse (1) 	(4)
	Total for question	(12)

Question Number	Answer	Mark
5(a)i	<p>Materials</p> <ul style="list-style-type: none"> • Recyclable/biodegradable materials have been used for its manufacture (1) • At the end of its life the materials can be recycled/biodegrade (1) • Efficient production consumes less energy (1) • The materials are able to accept a range of printing for application of company/contents/recycling details (1) • polymers are durable (1) • Low quality polymers as appearance/colour not important (1) • The casing is designed to keep the product in optimum condition/prevent leakage (1) • Locally/easily sourced materials (1) • Chemically resistant (1) • Material is chosen for optimal material usage/reduced waste (1) 	(4)
5(a)ii	<p>Distribution</p> <ul style="list-style-type: none"> • Packaging is reduced to a minimum (1) • The materials used to make the product are as light/small as possible (1) • The outer packaging is designed to keep the contents from being broken in transit (1) • Refilling of the product reduces the transport costs/carbon footprint (1) • Multi packs reduce distribution costs (1) • Reduced transport costs for small/light/compact products (1) 	(3)
5(b)	<ul style="list-style-type: none"> • Portability (1) • The increased number of features it is possible to incorporate (1) • The fashion/aesthetic appeal of 'small is beautiful' (1) • Less energy is needed to power the product (1) • Less material is needed, reducing manufacturing costs (1) • Reduced transport costs (1) • Discreetness/secretcy (1) • Takes up less space (1) • Less weight (1) 	(3)

5(c)	<ul style="list-style-type: none"> • Easy to lose/misplace (1) • Less workers required due to automation (1) • More difficult to use/ergonomics (1) • Obsolescence – people buy the 'latest' version even though the old one functions perfectly well (1) • Increased precision required for manufacture (1) • Harder/unlikely to be repaired (1) 	(2)
	Total for question	(12)

Question Number	Answer	Mark
6(a)	<p>Wind farms</p> <p>Advantages</p> <ul style="list-style-type: none"> • No emissions (1) • Relatively little maintenance/running costs (1) • Often situated in remote locations (e.g. off-shore/hill top) (1) • Low cost power (1) • Renewable source of power (1) • Don't require infrastructure/transport to re-supply raw materials (e.g. fossil fuels) (1) • Micro generation possible (1) • Land around wind farms can still be used (e.g. farmed) (1) • Surplus privately generated electricity can be sold back to the national grid (1) <p>Disadvantages</p> <ul style="list-style-type: none"> • Harm the 'natural beauty' of an area (1) • Noise/vibration (1) • Reduction in property prices within the vicinity of a wind farm (1) • Only useable when the climate is right/wind conditions correct (1) • High set-up costs (1) • Low energy production per unit (1) • Wind farms require a lot of space/real-estate (1) • Danger to low flying planes / wildlife (1) • Unsightly/eyesore (1) • Can only be set up in specifically windy areas (1) • Infrastructure is required to supply the energy from the remote location (i.e. cabling) (1) <p><i>[Maximum of 9 marks if only Advantages or Disadvantages are given]</i></p>	(10)
	Total for question	(10)

Question Number	Answer	Mark
7	<p>Advantages</p> <ul style="list-style-type: none"> • Continuous/24-7 production (1) • Working in hostile/hazardous environments (1) • Consistent repeated movements/accuracy (1) • They can undertake uncomfortable, tiring and monotonous tasks (1) • Speed/productivity is increased (1) • CNC machines and robots combine to create FMS (1) • Shorter pay-back/lead time (1) • Designers can design with robot assembly in mind (1) • Enables automated and robotic testing and quality control (1) • Keeps work environment safe e.g. sensor shuts down machines if hands are in the way (1) • Higher levels of complexity/accuracy/quality are possible (1) • Flexible/reprogrammable (1) • Reduced labour costs for manufacturer (1) • They can carry extremely heavy loads (1) • Reduced human/production errors/wasted materials (1) <p>Disadvantages</p> <ul style="list-style-type: none"> • Reduced employment (1) • High set-up costs making it harder to set up new businesses (1) • The need for regular training/retraining (1) • Decreased interest/ownership/moral of the workers (1) • Robots do not have such responsive sensors as humans (1) • Maintenance/repair/reprogramming costs (1) • Inability to make decisions (1) <p style="text-align: center;"><i>[Maximum of 7 marks if only Advantages or Disadvantages are given]</i></p>	(8)
	Total for question	(8)

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