

Mark Scheme (Results)

Summer 2012

GCE Design and Technology
Product Design (6RM03)

Paper 01: Designing for the Future
(RMT)

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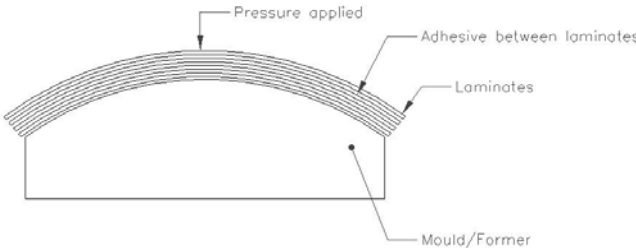
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Publications Code UA032008*

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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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Order Code UA032008 Summer 2012

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