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Mark Scheme (Results)

Summer 2012

GCE Design and Technology
Product Design (6RM02)

Paper 01: Design and Technology in Practice (RMT)

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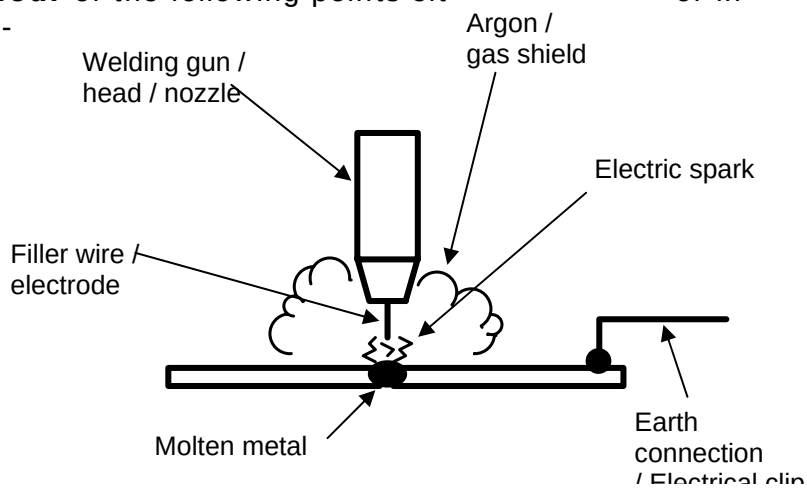
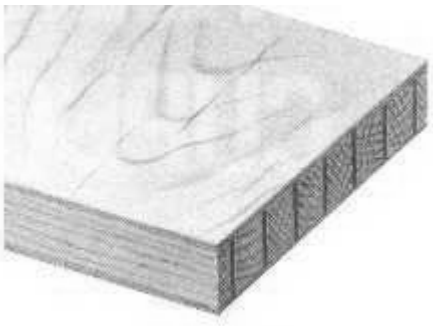
Question Number	Answer	Mark
1(ai)	Only acceptable answer:- • A reference to warning personnel about flammable substances / fire.(1) (1 x 1)	(1)
1(aii)	Only acceptable answer:- • A reference to warning personnel about high voltage / electricity / risk of electric shock.(1) (1 x 1)	(1)
1(aiii)	Only acceptable answer:- • A reference to warning personnel about lasers.(1) *Do not accept 'Bright light' responses.* (1 x 1)	(1)
1(b)	Only acceptable answer:- • Circular signs are a command /mandatory / prohibition signs. (1) (Triangular are warning). (1 x 1)	(1)
1(c)	Any two of the following :- • Maximum safe exposure / controlling exposure e.g. extraction.(1) • Maintenance of protective equipment. (1) • Training in safe working / handling of hazardous materials. (1) • Frequency of monitoring / surveillance exercises. (1) • Safe methods of storing the materials. (1) • First aid measures in the event of accident / exposure.(1) • Safe methods of disposing of waste. (1) • Essential signage required. (1) (2 x 1)	(2)
	Total for question	**6**

Question Number	Answer	Mark
2(ai)	Any **one** of the following (Abbreviated or full name):- • HDPE – High density polyethylene • LDPE - Low density polyethylene • PP - Polypropylene • PVC – Polyvinyl chloride • ABS – Acrylonitrile butadiene styrene • PS – polystyrene • Nylon • Rubber *Note - Do not accept acrylic*. (1 x 1)	(1)
2(aii)	Only acceptable answer:- • Injection moulding (1 x 1)	(1)
2(b)	Any two linked points from **three** of the following :- • Strength, (1) resist large forces (1) from peoples bodies / weights. (1) • Toughness (1) resist the knocks / impacts (1) from weights being repeatedly banged against the frame.(1) • Plasticity / malleable (1) can be easily bent/formed (1) into the shapes required. (1) • Fusibility (1) can be welded / brazed (1) so that it can be easily/strongly joined. (1) • Hardness (1) resists abrasion / scratching / does not wear away easily (1) so that pivots / moving parts will last a long time. (1) (2 x 3)	(6)

2(c)	Any **four** of the following points either in diagram or in text:-  	

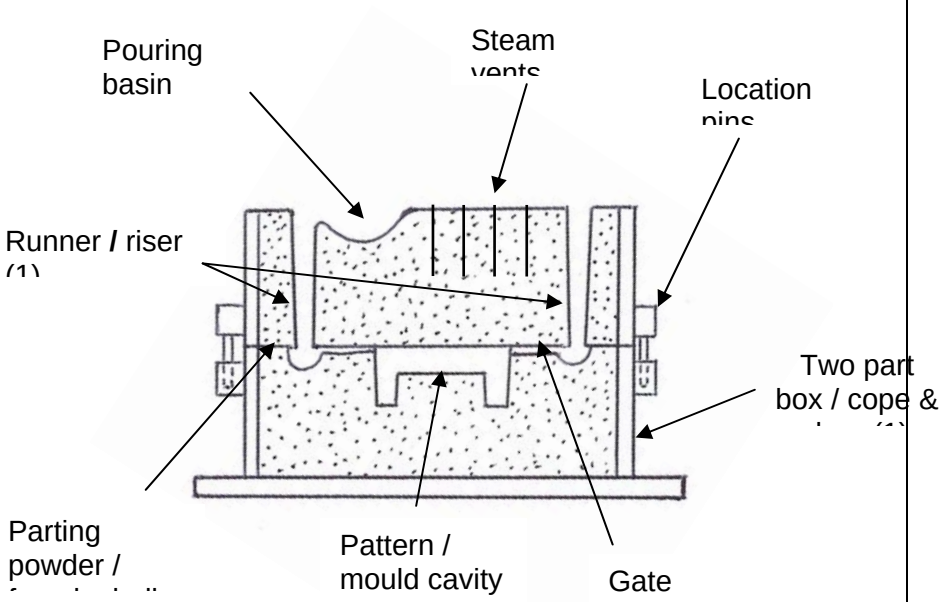
	• Recognisable welding gun/ torch / nozzle. (1) • The work is electrically connected to the earthing cable. (1) • An electrical spark. (1) • A filler wire / electrode is fed through the gun. (1) • The materials are melted / molten / fused together. (1) • Argon gas / gas shield is fed over the weld pool. (1) If wrong welding process shown e.g. oxycet / arc / TIG then maximum 2 marks. (1 x 4)	(4)
2(d)	Any **two** of the following with a linked relevant explanation:- • Enable repetitive accuracy / reduction in errors (1) leading to less faulty / wasted components and materials. (1) • Components are easily /quickly aligned / no marking out (1) which speeds up production / saves time. (1) • Enable less skilled personnel to carry out the tasks (1) reduced labour costs. (1) (2 x 2)	(4)
	Total for question	**16**

Question Number	Answer	Mark
3(a)	A sketch showing the following clear or labelled features:-  • Surface laminates / veneer.(1) • Thick layer of internal strips.(1) • Grain opposing / rotated on laminates / strips. (1) • Adhesive to bond blocks / laminates together. (1) • Blocks of approximately 25mm used. (1) (1 x 3) *[NB. If plywood, chip board, MDF then no marks]*	(3)
3(b)	Any three of the following with a linked relevant explanation:- • Cheaper (1) as it is manufactured from low grade timber / off-cuts / for making low cost furniture /increasing profits. (1) • Available in wide boards (1) so easy to cut to sizes needed for furniture panels / so no edge jointing needed / not limited to tree width. (1) • Has no grain (1) so is stable / will not warp / twist / split / move as much as solid timber. (1) • Smooth finish (1) so less surface preparation is needed before a finish is applied. (1) • No natural faults / knots (1) so it is easily worked /that cause problems during manufacturing. (1) • Uniform strength in all directions (1) so no consideration has to be given to the grain direction. (1) (2 x 3)	(6)
	Total for question	**9**

Question Number	Answer	Mark
4(a)	Any 4 of the following:- • Fast method of production. (1) • Can cut complex profiles.(1) • The machine works very accurately. (1) • High level of repetitive accuracy achieved / no human error / less waste. (1) • Minimal labour needed / minimal labour costs. (1) • Safe method of production. (1) • Shape is easily programmed (1) • Data is easily saved / retrieved for future batches. (1) *[Do **not** accept an unqualified 'cheaper'*] (1 x 4)	(4)
4(bi)	Only acceptable answer:- • The two parts are mixed / adhesive mixed with catalyst before being applied. (1) (1 x 1)	(1)
4(bii)	Any 3 of the following :- • Sufficient strength for this purpose. (1) • Good gap filling properties / expands in hole / high viscosity (1) • Will bond both materials / bonds wide range materials. (1) • Fast setting versions to allow rapid joining (1). • Slow setting versions allow for accurate positioning / adjustment. (1) • There are no significant H&S issues / non toxic / will not burn. (1) (1 x 3)	(3)
	Total for question	**8**

Question Number	Answer	Mark
5(ai)	Only acceptable answer :- • Worm gear / worm wheel / worm and wheel. (1) (1 x 1) *[Do not accept '**whee**l' on its own.]*	(1)
5(aii)	Any 2 of the following with a linked relevant explanation:- • It gives a large gear ratio / velocity ratio / increases small input force (1) exerting a large output of force / high torque / strong pull.(1) • The system will not overhaul / run back when released / is self locking (1) so it is safe / will not drop the load. (1) • It is a compact / simple system compared to other systems that do a similar task (1) therefore the unit can be made smaller / cheaper. (1) (2 x 2)	(4)
5(b)	Any 4 points or relevant explanations from the following:- • They are cheaper (1) • They have less complex parts / simpler to make. (1) • They can take greater loads / stronger (1) • They spread the load over a greater surface / don't focus the force on points of contact.(1) • They work effectively at slow speeds. (1) [Do **not** accept **'**longer lasting']. [Do **not** accept 'maintenance / replacement' issues.] (4 x 1)	(4)
	Total for question	**9**

Question Number	Answer	Mark
6(a)	Any 2 of the following:- • Complex shapes can be produced.(1) • Effective / fast /cheap method of production (1). • Produces a strong component. (1) • Repeatable process (1). • Casting generates little waste / economic on materials. (1) • Low priority on dimensional accuracy / surface finish. (1) • Metals can be alloyed to give a range of properties (1) (1 x 2)	(2)

6(b)	Any 5 of the following features sketched clearly or labelled:-  • Two part box /cope and drag. (1) • Pattern / mould cavity. (1) • Riser / runner. (1) • Horizontal gate. (1) • Pouring basin/ ring. (1) • Parting powder / French chalk. (1) • Steam vents (1) • Location pins. (1) [Do **not** accept 'sand' as this is given in the question] **Any response that does not have a two part (split) moulding box should be given no marks.** (1 x 5)	(5)

6(c)	Any of the following points with a linked relevant explanation:- • It is faster (1) as die is reusable / you do not loose /break mould each time.(1) • It requires minimal labour (1) due to automation / not re-making moulds.(1) • It produces finer detail / smoother/ higher quality mouldings (1) as casting reflects a machined surface rather than sand texture (1) as pressure is used to force the metal into the die. (1) • It is more accurate (1) so will require less machining. (1) • High level of repetitive accuracy / less prone to error (1) due to collapsing sand mould (1) impurities .(1) • It is a safer process (1) due to molten metal being enclosed within the machine / not manually poured. (1) [Do **not** accept 'cheaper'.] [Do **not** accept an unqualified 'higher quality'.] (3 x 2) or (6 x 1)	(6)
	Total for question	**13**

Question Number	Answer	Mark
7(ai)	Any one of the following points :- • Product must meet / be tested against the relevant European directives. (1) *[Do not accept unqualified 'testing'.]* (1 x 1)	(1)
7(aii)	Any one of the following with a linked relevant explanation:- • To establish / maintain a common standard of goods being traded across Europe (1) which prevents poor quality / dangerous goods being imported / exported.(1) • To ease trade restrictions / encourage trade between European countries (1) by eliminating the need for a product to comply with each individual countries own quality standards. (1) (2 x 1)	(2)
7(b)	Any six of the following points but must include at least one positive and one negative to gain maximum marks:- **<u>Positives</u>** • Staff feel more valued / listened too / staff feedback accepted. (1) • Better working conditions / culture. (1) • Staff more highly motivated. (1) • Team mentality will be developed. (1) • Less staff absentees. (1) • Staff has increased job satisfaction / morale. (1) • Staff fully trained / has frequent training opportunities. (1) • Fair rates of pay. (1) • Improving health and safety. (1) • Each department treated as a client. (1) • Improved product quality / less failure products and components. (1) • Improved company reputation. (1) • Develop an ethos of continuous improvement. (1) • Increased sales / market share. (1) • Improved productivity /profits. (1) • Gain BSI/ISO 9000 mark / trade with ISO.9000 companies. (1)	

	<u>Negatives</u> • Additional costs of developing new ways of working. (1) • Additional costs of training staff. (1) • On-going costs of responding to workforce proposals. (1) • Benefits will take time to filter through. (1) • Some staff may be reluctant to embrace change.(1) (6 x 1) *[Max 5 marks from one section]*	(6)
	Total for question	**9**

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