Mark Scheme (Results)

Summer 2017

Pearson Edexcel GCSE in Manufacturing & Engineering (5EM03)
Paper 3C: Textiles and clothing

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General Marking Guidance

- All learners must receive the same treatment. Examiners must mark the first learner in exactly the same way as they mark the last.
- Mark schemes should be applied positively. Learners must be rewarded for what they have shown they can do rather than penalised for omissions.
- Examiners should mark according to the mark scheme not according to their perception of where the grade boundaries may lie.
- There is no ceiling on achievement. All marks on the mark scheme should be used appropriately.
- All the marks on the mark scheme are designed to be awarded. Examiners should always award full marks if deserved, i.e. if the answer matches the mark scheme. Examiners should also be prepared to award zero marks if the learner's response is not worthy of credit according to the mark scheme.
- Where some judgement is required, mark schemes will provide the principles by which marks will be awarded and exemplification may be limited.
- When examiners are in doubt regarding the application of the mark scheme to a learner's response, the team leader must be consulted.
- Crossed out work should be marked UNLESS the learner has replaced it with an alternative response.
- Mark schemes will indicate within the table where, and which strands of QWC, are being assessed. The strands are as follows:

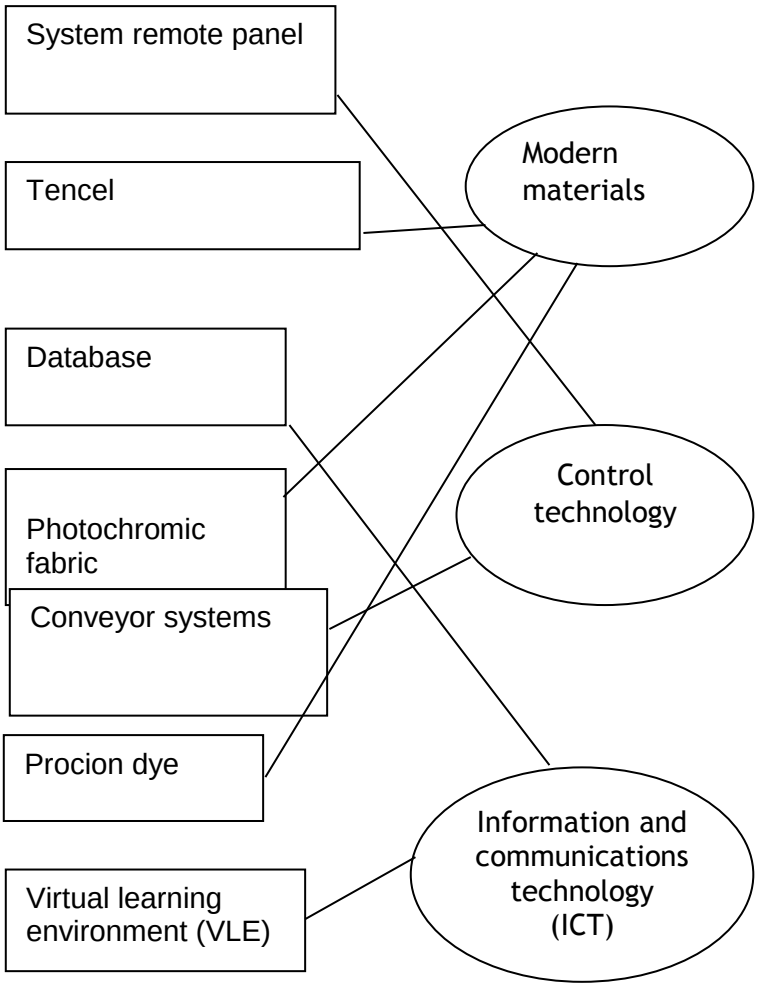
  i) Ensure that text is legible and that spelling, punctuation and grammar are accurate so that meaning is clear

  ii) Select and use a form and style of writing appropriate to purpose and to complex subject matter

  iii) Organise information clearly and coherently, using specialist vocabulary when appropriate.

Question Number	Answer	Mark
1(a)	• Tea towel • Toiletry bag *If 3 boxes or more crossed - no marks.* (2 x 1)	**(2)**
1(b)	• T-shirt • Parka *If 3 boxes or more crossed - no marks.* (2 x 1)	**(2)**
		(Total 4 marks)

Question Number	Answer	Mark
2(a) 1	• Overlocker *Accept any recognisable spelling (phonetic) of the answers above* (1 x 1)	**(2)**
2(a) 2	• Heat press *Accept any recognisable spelling (phonetic) of the answers above* (1 x 1)	
2(b) 1	An answer that makes reference to two of the following points: • Used where a lacing is required (1) • Used to reinforce a hole (1) • A decorative fastening (1) • Used on shoes/corsets/coats/garments (1) *Accept any other appropriate response* e.g. a decorative fastening (1) that is used with a lace (1) (1 x 2)	**(4)**
2(b) 2	An answer that makes reference to two of the following points: • Used to hang garments (1) • Used as a bag strap (1) • Used for decorative purposes (1) • Prevents bags from being stolen (1) *Accept any other appropriate response* e.g. Used for bag straps (1) as well as hanging coats and other garments (1) (1 x 2)	
		(Total 6 marks)

Question Number	Answer	Mark
3	Key terms linked to a key area  *No mark awarded where 2 or more lines are drawn from a term. Lines do not have to be straight but term and key area must be clearly linked.* (7 x 1)	**(7)**
		(Total 7 marks)

Question Number	Answer	Mark
4(a)(i)	Appropriate two **products**, such as: • Baby carriers • Biker gloves • Sport bags • Swimsuits • Fire protective suit • Bullet proof vest • Oven gloves • Performance sports wear • Hiking boots • Weather protective jackets • Nightwear • Umbrella • Baseball cap • High-visibility jacket A brand name of a specific product is acceptable *This list is not exhaustive, accept any product from the textiles and clothing sector that use printing processes in their manufacture* (2 x 1)	**(2)**

Question Number	Answer	Mark
4(a)(ii)	Appropriate two processes, such as: • Rotary screen printing • Flat screen printing • Inkjet printing • Sublimation printing • Engraved roller printing *Accept any other appropriate response* *The printing method named must be suitable for an industrial scale e.g. not block printing etc.* (2 x 1)	**(2)**

Question Number	Answer	Mark
4(a)(iii)	• Rotary screen printing – Push ink through a cylindrical screen (1) which exposes and hardens (1) • Flat screen printing - uses a stencil (1) through which textile ink is pushed (1) • Inkjet printing – modern ink jet printers can be used with specially prepared fabric (1) which will use liquid textile ink (1) • Sublimation printing – special sublimation inks can be used on specialist paper which sublimates into the fibres (1) by using a heat press (1) • Engraved roller printing – images are engraved onto a roller (1) and the ink left in the engraving will make the print (1) *Accept any other appropriate response* (1 x 2)	**(2)**
4(b)	One mark for each technique One mark for each description Visual inspection (1) to check for defects and blemishes (1) Measurement checks (1) to compare against specified tolerances (1) Optical checks (1) to ascertain alignment (1) Functional checks (1) to check the operation of the product (1) Material/component checks (1) to meet specification (1) *Accept any other appropriate response* *No credit for repetition* *Low response (1) or two low responses (2), or detailed response (2) for each of the techniques.* (2 x 1) (2 x 2)	**(4)**
		(Total 10 marks)

Question Number	Answer	Mark
5(a)	Accept any two responses: • To control machine processes (1) • To assist in the operations of a manufacturing plant (1) • To assist in planning (1) • To assist in management (1) • To assist in transportation (1) • To assist in storage (1) • To create a faster production process (1) • To reduce waste (1) • To reduce energy consumption (1) • To improve product consistency (1) • To improve product accuracy (1) *Accept any other appropriate response* (2 x 1)	**(2)**
5(b)	One mark for identifying the disadvantage One mark for the description • The software itself is expensive (1) so initial costs are high (1) • Can be slower than traditional methods (1) for one-off or low-volume production (1) • Training costs are high (1) when staff are using software and machinery (1) • Can be expensive to maintain (1), as highly skilled technicians required to carry out repairs (1) • Programming errors can occur (1), creating defective batches of products (1) • Consumers can look negatively (1) on this 'deskilling' of workers (1) *Accept any other appropriate response* (1 x 2)	**(2)**

Question Number	Answer	Mark
5(c)	One mark for identifying each benefit One mark for each description • PLCs control manufacturing devices i.e. laser cutters/NC/CNC machines/robots/printers (1) to improve quality (1) • PLCs give continuous operation (1) as they do not need breaks (1) • PLCs can repeat actions (1) indefinitely (1) • PLCs can work in hazardous environments (1), reducing dangers for workers (1) • PLCs can work with fewer staff (1), reducing costs (1) *Accept any other appropriate response* *No credit for repetition* *Low response (1) or two low responses (2), or detailed response (2) for each of the benefits.* (2 x 1) (2 x 2)	**(4)**
		(Total 8 marks)

Question Number	Answer	Mark
6(a)(i)	Any one of the following: • Mobile phone/infrared/bluetooth • Video conferencing • Voice over Internet Protocol (VoIP) • Electronic point of sale (EPOS) • EDI • ISDN • Texting • Phone • Walkie talkie • Fax • Smart phone • Tablet *Accept brand names of the above* *Accept any other appropriate response* (1 x 1)	**(1)**
6(a)(ii)	An answer that makes reference to **two** of the following points: • A method of connecting devices • A local area network (LAN) • Hotspots • Wireless connection • Access to the internet • Access with router • Allows you to use email • Allows easy communication • Enables the internet of things *Accept any other appropriate response* e.g. A method of connecting devices (1) which allows easy communication (1) (1 x 2)	**(2)**
6(b)	One mark for identifying each reason One mark for each explanation The use of a dedicated computer system (1) within a larger system to perform specific functions (1) To monitor each process (1) as each part of the process has its own embedded system (1) Embedded computers are integral to process design (1) as industrial workplaces can often be harsh environments (1)	**(6)**

Question Number	Answer	Mark
	Embedded systems don't require large power supplies (1) because they integrate dedicated/miniaturised componentry (1) Embedded computers reduce the need for cooling (1) as they will produce a lot less heat (1) There is minimal ingress of moisture/dust/chemicals (1), as it can be a fan-less system (1) Easier maintenance (1), no need to trace component faults/instant diagnosis (1) Allows opportunities for effective change of function (1) as the embedded computer can be reprogrammed when required (1) *Accept any other appropriate response* *No credit for repetition* *1 x 1 mark low response, 3 x 1 mark three low responses, or detailed response (2) per reason* (3 x 2)	
		(Total 9 marks)

Question Number	Answer	Mark
7(a)	One mark for identifying the benefit, up to two marks for the explanation: • Allows online questionnaires to be used (1) instant feedback (1) target market can be established (1) • Demographic information can be analysed (1) existing products known to target market (1), allows matching customer requirements (1) • Information about materials can be obtained (1) suitability for product (1) cost details (1) • Compare existing products (1) to optimise the development of the design (1) minimising the cost of the product (1) • To generate break even data (1) through the use of spreadsheets (1) to calculate cost of production (1) *Accept any other appropriate response* Low response (1) or detailed statement (3) (1 x 3)	**(3)**

Question Number	Answer	Mark
7(b)	One mark for identifying the benefit, up to two marks for the explanation: • Fewer material shortages (1) by accessing stock records (1) and matching orders accordingly (1) • Improved scheduling (1) by accessing orders (1) and minimising downtime (1) • Efficient utilisation of staff (1) by utilising training/skills records (1) to ensure skilled staff are in the appropriate position (1) • Appropriate allocation of plant/equipment (1) by accessing resources list (1) and process capability (1) • Set control points for quality checks (1) access product specifications (1) to minimise product waste (1) • Allows modelling of deadlines (1) use of spreadsheets (1) access to process data (1) • Maximise machine efficiency (1) by ensuring correct process allocation (1) from accessing computer stored data and information (1) *Accept any other appropriate response* Low response (1) or detailed statement (3) (1 x 3)	**(3)**
		(Total 6 marks)
	Total Marks for Section A	**50**

Question Number	Answer	Mark
8(a)	An answer that makes reference to any of the following points: • For quick / easy access (1) • For security as a zip is a secure form of fastening (1) • To allow access to a certain part of the rucksack without having to unzip the whole thing (1) • Can allow a lock to be put between the two zips (1) • Allows flexibility to position the lock anywhere along the zip area (1)  *A lock can be placed inbetween the two zip pulls (1) making it an even more secure fastening (1). Also if the user wants something from one side of their bag the whole bag doesn't need to be unzipped (1)* *Accept any other appropriate response* *Must have notes and sketches (notes or sketches only, maximum 2 marks)* *1 x 1 mark low response, or up to 3 marks for detailed response* (1 x 3)	**(3)**
8(b)	An answer that makes reference to any of the following points: • To allow the user to carry items (1) • To allow for items that may need easy access e.g. water bottle(1) • The elastic holds the items into place so that they are more secure (1) • The pockets are partially see through to allow the user to see what is in them (1)  *The user can carry their water bottle (1) in the pocket as the elastic will hold the bottle securely in place (1)*	**(3)**

Question Number	Answer	Mark
	Accept any other appropriate response *Must have notes and sketches (notes or sketches only, maximum 2 marks)* *1 x 1 mark low response, or up to 3 marks for detailed response* (1 x 3)	
8(c)	An answer that makes reference to any of the following points: • The straps allow the user to carry the bag on their back (1) • The padding makes them more comfortable (1) • The adjustable buckle can be altered to allow for different size users(1) • The adjustable buckles can be tightened so that the user gets a better 'hold' on their items (1) • Distributes the weight (1)  *The two straps allow the user to carry the bag on their back (1) the padding makes them more comfortable to use (1) and the adjustable buckles allow the user to alter the size of the straps (1)* *Accept any other appropriate response* *Must have notes and sketches (notes or sketches only, maximum 2 marks)* *1 x 1 mark low response, or up to 3 marks for detailed response* (1 x 3)	**(3)**
		(Total 9 marks)

Question Number	Answer	Mark
9(a)(i)1	• Processing and production • Production and processing • Production processing • Production • Processing *Accept any recognisable spelling (phonetic) of the answers above* (1 x 1)	
9(a)(i)2	• Assembly and finishing • Finishing and assembly • Assembly • Finishing *Accept any recognisable spelling (phonetic) of the answers above* (1 x 1)	**(2)**
9(a)(ii)	• Design • Stage 1/stage one • One/1 • First/ First stage (1 x 1)	**(1)**
9(b)	An answer that makes reference to any of the following: • Gathering consumer opinion (1) • Calculating product costs (1) • Developing market plan (1) • Using market research (1) • Developing a competitive edge (1) • Advertising the rucksack (1) • Promoting the rucksack (1) • Carrying out questionnaires/surveys (1) • Pricing for the target market (1) • Using trade/electronic (internet, email) media (1) • Identifying gaps in the market (1) *Accept any other appropriate response* (3 x 1)	**(3)**
9(c)	Appropriate descriptions including three of the following points (statements must be applicable to the rucksack: • Rucksacks packaged (e.g. plastic bags) (1) • Rucksacks boxed (1) • Boxes packed onto pallets (1) • Items sent to retailers (1) • Bar coding applied to boxed sets of products (1)	

Question Number	Answer	Mark
	• Details sent to finance department for invoicing requirements (1) • Planning route for delivery (1) • Selecting correct packaging materials/equipment (1) • Sealing packaging (1) • Packing/shipping lists (1) • Labelling (1) • Gathering together of manufactured parts (1) • Final quality control checks (1) • Stock control (1) *Any other appropriate response but must be related to the manufacture of rucksacks* e.g. At this stage the rucksack would be put into plastic bags (1) and then sent to the customer (1). The details of this would then be sent to the finance department (1). *Up to 3 marks* *1 x 1 mark low response, 3 x 1 mark 3 low responses, or up to 3 marks for a detailed response* (1 x 3)	**(3)**
		(Total 9 marks)

Question Number	Answer	Mark
10(a)	• Ripstop fabric • Hessian • Twill weave • Nylon • Polyester The answer can make reference to a fibre or a fabric as long as it is appropriate *Accept any other appropriate response* (1 x 1)	**(1)**
10(b)(i)	Any three of the following: • Lay planning • Spreading • Folding • Cutting • Die cutting • Bonding • Sewing / stitching / lock stitching • Moulding • Overlocking Do not accept fusing *Accept any other appropriate response* *Accept any recognisable spelling (phonetic) of the answers above* (3 x 1)	**(3)**

Question Number	Answer	Mark
10(b)(ii)	An explanation that makes reference to three of the following points: • Creates a quality finish • Reliable process • Minimal waste • Products have consistent quality – internal items will not get wet • Can deal with difficult weather conditions • Safer process with regards to using the product • Quick method/fast production rate when set up *Accept any other appropriate response* e.g. Heat sealing creates a quality finish (1) as it allows the seams to become waterproof (1) which may be needed if the rucksack is used in difficult weather conditions (1) *3 x 1 mark for 3 low responses, or up to 3 marks for a detailed response* (1 x 3)	**(3)**
10(c)	An explanation that makes reference to three of the following points: • Improved aesthetics • Better ergonomics • Better functionality/strength • Longer lasting/durable • More consistent product • More accurate product • More reliable product • Safer product • Lower costs • Increased efficiency • Lower purchase price • Allows for product guarantee • Allows for increased range/variation of product • Lighter product • Appropriate-sized product *Accept any other appropriate response* e.g. Modern materials have better functional characteristics (1), are more durable (1) and allow for greater consumer choice (1)	**(3)**

Question Number	Answer	Mark
	3 x 1 mark for 3 low responses, or up to 3 marks for a detailed response (1 x 3)	
		(Total 10 marks)

Question Number	Answer	Mark
11(a)	An answer that makes reference to any of the following: • The use of systems (1) to control machinery / processes (1) • The use of control systems (1) to replace human operators (1) • The ability of a process (1) to operate without the need for human sensory input (1) • Mechanical devices that are operated electronically (1) and function automatically (1) *Accept any other appropriate response* (1 x 2)	**(2)**
11(b)(i)	One mark for each example One mark for each description • Use of conveyor systems (1) to move the product from one process to the next (1) • Flexible manufacturing system/embedded computers (1) to perform dedicated functions at some steps of production (1) • Machine monitoring (1) to control quality and accuracy (1) • To improve safety (1) in hazardous conditions by using robots (1) • PLCs (1) to control processes in production (1) • Automated printing/embroidery (1) of decoration/logos (1) • Automated cutting (1) of pattern pieces (1) *Accept any other appropriate response* *No credit for repetition* *1 x 1 mark low response, 3 x 1 mark 3 low responses, or detailed response (2) per example* (3 x 2)	**(6)**
11(b)(ii)	One mark for the disadvantage One mark for the explanation • Increased capital cost (1) due to purchase of equipment (1) • Increased noise (1) due to more machines being used (1) • Increased energy usage (1) as increased power requirements of the machines (1) • Increased maintenance costs (1) as more equipment to monitor and maintain (1)	**(2)**

Question Number	Answer	Mark
	• More training required (1) to be able to operate the equipment (1) *Accept any other appropriate response* (1 x 2)	
11(b)(iii)	One mark for the benefit One mark for the explanation • Consistent product (1) as controlled better (1) • Product reliability (1) as more likely to be produced to specification (1) • Reduced delivery time (1) as manufacturer can vary product to suit demand (1) • Lower prices (1) as less waste and quicker assembly (1) • Product guarantee (1) as confidence in the automation process (1) • Customer satisfaction (1) because of consistent products (1) *Accept any other appropriate response* (1 x 2)	**(2)**
		(Total 12 marks)

Question Number	Answer	Mark
12(a)(i)	An answer that makes reference to two of the following points: • Reduced noise (1) • Quieter machines (1) • Cleaner workplace (1) • Fewer hazards (1) • Modern technology can replace workers in hazardous areas (1) • Healthier environment (1) • Atmosphere cleaned (1) • Less vibration (1) • Less risk of accidents/injury (1) *Accept any other appropriate response* (2 x 1)	**(2)**
12(a)(ii)	One mark for identifying each effect One mark for each explanation • Continuous operation (1) reducing time (1) • Modern machines (1) faster production (1) • Reduced costs (1) by automating processes (1) • Access to data (1) allows constant monitoring (1) • Eliminating worker waste (1) improves use of time (1) • Less waste produced (1) due to carefully controlled production (1) *Accept any other appropriate response* *Do not accept cheaper, faster, quicker without an explanation* *No credit for repetition* *Low response (1) or two low responses (2), or detailed response (2) for each of the effects* (2 x 1) (2 x 2)	**(4)**
12(b)	One mark for identifying each advantage One mark for each explanation • Modern machines use less energy (1) so reducing CO2 emissions (1) • Smaller products (1) less use of natural resources (1) • Less waste/reworking of materials (1) less materials used/processing (1)	**(4)**

Question Number	Answer	Mark
	• Transportation reduced (1) saving of fossil fuels /less emissions(1) • Use of alternative energies (1) reducing energy requirements (1) *Accept any other appropriate response* *No credit for repetition* *Low response (1) or two low responses (2), or detailed response (2) for each of the advantages* (2 x 1) (2 x 2)	
		(Total 10 marks)

Question Number	Answer	Mark
13	One mark for identifying each impact One mark for each explanation Real time stock taking (1) reduces waste of stock (1) Simplified sourcing (1) Improved cost control (1) Use of barcodes (1) improved material traceability (1) Direct links to supplier and other departments (1) allowing immediate updating of material lists (1) Allows more frequent ordering (1) meaning less storage space required (1) Accurate modelling of material usage (1) ensures less stock out (1) Identifies potential obsolescence (1) avoids over ordering (1) Search facilities using databases/spreadsheets (1) allow sourcing/ordering of alternative materials (1) *Accept any other appropriate response* *Do not accept cheaper, faster, quicker without an explanation* *No credit for repetition* *Low response (1) or two low responses (2), or detailed*	**(4)**

Question Number	Answer	Mark
	response (2) for each impact (2 x 1) (2 x 2)	
		(Total 4 marks)

Question Number	Answer	Mark
14 **QWC i, ii, iii**	**Indicative content** • Use of energy management systems • Intelligent lighting • Use of low energy devices • Energy consumption alarms • Minimising over production • Start up and shut down scheduling • Generating own sources of energy • Lean manufacturing techniques • Efficient production planning • Minimise high/low temp operations • Pre-heating • Use of heat exchangers/heat pumps/heat sinks • Improved insulation • Energy recovery systems • Retrofit PLCs • Reduce transportation/movement • Improve staff awareness e.g. manufacturers can use peak and demand monitor devices which will suggest better consumption methods that can be automatically actioned. They will be able to control their energy use by careful strategies such as intelligent lighting and the fitting of low energy devices. Manufacturers could use their own sources of supply such as solar panels/wind turbines or use heat pumps to service some energy needs. Other areas of energy control can be achieved by careful planning and use of insulation.	**(6)**
		(Total 6 marks)

Level	Mark	Descriptor
	0	No material deserving of reward
1	**1-2**	The learner identifies at least two methods of monitoring/controlling energy consumption or gives a brief description of one method. The learner shows limited knowledge of monitoring/controlling energy consumption. The learner uses everyday language and the response lacks clarity and organisation. Spelling, punctuation and the rules of grammar are used with limited accuracy.

Level	Mark	Descriptor
2	**3–4**	The learner gives a brief description of two methods of monitoring/controlling energy consumption or a detailed description of one method. The learner shows good knowledge of monitoring/controlling energy consumption. The learner uses some manufacturing/technological terms and shows some focus and organisation. Spelling, punctuation and the rules of grammar are used with some accuracy. Some spelling errors may still be found.
3	**5–6**	The learner gives a detailed explanation of at least two methods of monitoring/controlling energy consumption. The learner shows a developed knowledge of monitoring/controlling energy consumption. The learner uses a range of appropriate manufacturing/technological terms and shows good focus and organisation. Spelling, punctuation and the rules of grammar are used with considerable accuracy.
		(Total 6 marks)
Total Marks for Section B		**60**
Total Marks for the whole paper for Sections A & B		**110**