Examiners' Report

June 2014

GCE Design & Technology 6RM03 01

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Introduction

The structure of this paper followed the previous format in that it contained seven questions, with an average of 10 marks per question and it had a time limit of 120 minutes. Most questions are broken into sub-sections (items) in order to access a greater range of the specification. Where possible the sub-sections are generally related, though this is not always the case. Some questions, generally towards the end of the paper, require a more in-depth answer and command a larger number of marks per response. This year the minimum mark for an item is 2 marks, ranging up to a maximum of 13 marks for a full question.

Question 1 (a)

This question was designed to elicit four separate points of knowledge/information when comparing the advantages for a company when using a Local Area Network compared with using the Internet.

> 1 LAN'S can be monitored and Controlled unlike the Internet.
> 2 Generally a lot Quicker as it is covers a Smaller area such as a building
> 3 everyone has acess to Files that are within the LAN, no need to pass Information around.
> 4 A LAN is Safer than the internet as it is a Closed network only employees of the Company

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Examiner Comments

This is an example of a well thought through response to the question and scored 4/4 marks for the following:

• Monitored/controlled. Quicker. Everyone has access to files. A LAN is safer.

ResultsPlus
Examiner Tip

'Give' questions do not require a justification so candidates need not give a second part to their answer in order to score the mark. For example, answer 2 would have scored a mark for just stating, 'Generally a lot quicker'. However, this is a little vague and a better answer would have been: 'It is generally a lot quicker to send data around a LAN'.

> 1 data can be sent around t diffrent Computers without be hacked so its safer for sharing documents
> 2 not need password t connect as Just plug it in, Means easier to setup.
> 3 ~~data is secure LAN is less exper~~ lan is less exspensive than internet so reduces cost for companyis
> 4 as computer are connected large amounts of information can be sent quicker than internet.

ResultsPlus
Examiner Comments

Some of the answers here are not factually accurate so this answer scores 2/4 for the following:

• Safer.
• Info sent quickly.

ResultsPlus
Examiner Tip

It is very important to write complete sentences, even for these bullet-point style questions. Answer 2 for example leaves quite a lot for the examiner to 'assume'.

Question 1 (b)

This question was designed to elicit four related points relating to the use of computer technology to control quality on a production line.

> one way that computer technology is used to control quality on the production line is using Computer aided quality (CAQ) this helps make sure that each product is of a high quality by scanning every product before it starts the next stage of its manufacturing process. This means that if a product is faulty the problem can be identified and fixed before any more products are ruined.

ResultsPlus
Examiner Comments

This is a well structured answer and scored 4/4 marks for the following:
- Scanning.
- Every product.
- Problem can be identified and fixed.
- Before any more products are ruined.

> Computers are used to control the temperature of plastic during the injection moulding process. Computers can monitor the heat of the plastic and allow it to be at optimum temperature for the process, providing any checks needed

ResultsPlus
Examiner Comments

Unfortunately this response is too generic and scored 0/4 marks. The questions states 'describe in **detail**' but the response only mentions controlling temperature during the injection moulding process, which gives no real indication of how this would be done, i.e. with the use of sensors, which feedback accurate/ real-time information resulting in changes being made to the process.

Question 2 (a)

This question was designed to elicit knowledge relating to an understanding of what is meant by the term Artificial Intelligence.

> A I is when computer are used as a Simulation. The A I can be commanded to follow a path that is chosen, or it can be given intelligence to be able to react to certain circumstances. This can be used in car crash Simulators, so as a real person does not get injured

ResultsPlus
Examiner Comments

Unfortunately this response scored 0/2 marks because it just conveys a computer that 'reacts to a stimulus' rather than thinks, problem solves or makes a decision for itself.

> Artificial intelligence is when a robot tries to repeat the human characteristics and behaviour. For example, hear a voice command and give a response or a solution (Expert system)

ResultsPlus
Examiner Comments

This response clearly shows an understanding of the subject and scored 2/2 marks for the following:

•   Tries to repeat human characteristics and behaviour.

•   Gives a solution. This phrase is a little different to the mark scheme but conveys enough information to show that AI has 'problem solved' and not just responded.

ResultsPlus
Examiner Tip

It is not necessary to use the exact words used in the mark scheme to score the marks, but it is important to make sure the answer conveys enough information for the examiner to be sure what the candidate means and this answer does.

Question 2 (b)

This question was designed to elicit three unrelated answers in response to diagrammatic representations from a flow chart.
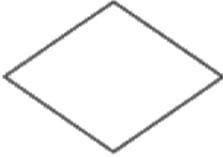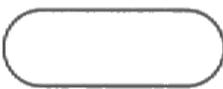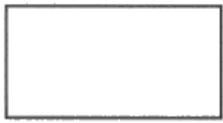
◇	Symbol 1 ...... A question
▭ (rounded)	Symbol 2 ...... Start / End
▭	Symbol 3 ...... A right step. A process

ResultsPlus
Examiner Comments

This is a simply formatted response which scored 3/3 marks for the following:
- A question – (difficult to read, but enough to convey a choice/decision is required) (1).
- Start/end (1).
- Process (1).
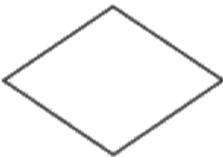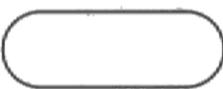
◇	Symbol 1 ...... It is a decision
▭ (rounded)	Symbol 2 ...... Start or end point on a diagram flow chart
▭	Symbol 3 ...... It is a function

Question 3 (a)

This was a two part question relating to the production and environmental impact of Biopol. The first part was designed to elicit a single response which described three stages of the process by which Biopol is produced. The second part was designed to elicit three unrelated responses relating to the environmentally friendly characteristics of Biopol.

1 Made from sugars not fossil fuels, reduced effect on environment (renewable) grown not extracted

2 Degrades to naturally occuring materials when in contact with microorganisms, light and water

3 Carbon neutral ~~manufacturing~~ process due to being ~~grown~~ ~~used~~ ~~the~~ production fermented instead of fractionally distilled which requires very high temperatures.

Question 3 (b)

This question was designed to elicit six unrelated points with reference to the harmful effects of deforestation. Many candidates scored well on this question, but too many candidates lost marks as a result of repeating answers. For example: loss of plant life; loss of animal life; destruction of wildlife habitats, leading to extinction of plant and animals, are basically all the same point - affecting biodiversity/eco-systems.

1. destroys The wild life

2. destroys areas of land which takes a long time to re-grow

3. polultin caused by tracks trucks and cutters

4. less trees means more carbon diriode in The environt as tree soakit up.

5. Using up a limited resource which would run out increing The price of timbr.

6. Nutrients in soil are so destroyed, take time to reproduce.

ResultsPlus
Examiner Comments

This answer contains six discrete responses and scored 6/6 marks for the following:

Destroys wildlife.

Long time to regrow.

Pollution by trucks.

More Co2.

Increasing price of timber. The benefit of the doubt has been given to this candidate on the word 'increasing' as it is not at all clearly written.

Soil's nutrients destroyed.

1. Loss of habitat

2. Destruction of forests that take in CO_2

3. High pollution levels from Equipment + Burning woodland

ResultsPlus
Examiner Comments

This answer scored 3/6 marks for the following:

Loss of habitat. This is a little vague but conveys an understanding of an increase in Co2 as a result.

Destruction of forests that take in Co2. Pollution from equipment. A little vague again but enough to score a mark.

Question 4 (a)

This question was designed to elicit four responses (either linked or discrete) concerning the advantages to manufacturers of using product data management systems. This question was not particularly well answered by many candidates, who often showed a general knowledge of the topic but were unable to give specific answers.

Product data management (PDM) system are the advantages to manufacturers of using it because;-

- It is quick to use the (PDM).

- It is easy and simple to use (PDM)

- It saves the peoples energy if the people have do it by themselves.

- It saves people's time because they can do the other stuff while its manufacturing it.

ResultsPlus
Examiner Comments

This answer scored 1/4 marks for the following:

It is quick to use the PDM. Whilst this is a rather vague and generic answer it does convey an understanding of a main aim of a PDM system, i.e. speed of access to data. The rest of the answer is really just a (vague) repeat of the element of quick to do/saves time, so scored no further marks.

A product data Management system manages all the data. This enables the Manufacturer to become more efficient. it enables a Quick and easy method of communication to allow people in the firm to see data relevant to planning, CAD models and CNC programs. and be able to improve them.

they allow stock level checks to take place and ordering new stock if necessary.

they also make Automated Stock retrieval System more efficient.

ResultsPlus
Examiner Comments

This is an excellent answer and scored 4/4 marks for the following:

Manufacturer becomes more efficient.

Quick easy method of communication.

Be able to improve them (i.e. the data, the cad models etc.).

Ordering new stock if necessary.

Automated stock retrieval systems more efficient. This response would have scored a mark, but had already been credited earlier in the answer.

ResultsPlus
Examiner Tip

The flow of the text and the use of correct technological vocabulary in this response makes it very easy to understand what the candidate is conveying.

Question 4 (b)

This question was designed to elicit a response which contained both points for and against a company choosing to use an enterprise resource planning system. Like Q4a, many candidates had an outline knowledge of the topic but were unable to move much beyond the more simplistic answers relating to costs of implementation and staff training.

one issue to consider would be what kind of manufacturing process the company is currently using, for instance a company using JIT needs reliable suppliers and therefore a ERP system would be advantageous. another thing to consider would be the kind of product and the quantities it is manufactured. For example if the product is a one-off then a ERP system should not be used. however if a product uses a continuous production line then an ERP system would be necessary in order to keep the product being produced.

An ERP system is where a series of material materials and resources are considered before a final choice is made.

therefore this system will be more common on goods that tend to be more expensive and where the material is key. For example on bicycles, materials are very important here because a road bike has to be light in weight and a mountain bike has to be strong

ResultsPlus
Examiner Comments

Unfortunately this response is far too generic and scored 0/6 marks. Whilst it does state one or two points, for example the statement, 'therefore a ERP system would be advantageous', this does not convey any understanding of why. The statement 'ERP would not be used for one-off' again does not say why, which is what the question requires.

ERP requires a ~~large~~ high captial outley to put in place which is only benificial if production is on a large enough scale. It can help to remove human error and ~~speed up~~ development thus reducing lead time and production/development costs. It also allows for better planning ~~so~~ so materials are only ordered when required meaning less excess stoch needing space to be stored, this also means less energy is wasted due to materials only being moved when needed, less time is wasted too. There is also fewer labour wastes as uneccessary processes can be identifyed and removed. This can all help in implementing lean manufacturing.

However companies should ~~also~~ also considers the need for more highly skilled staff to programme and operate an ERP system, who will require retraining adding expense. This said the intergrated system has many benefits that ~~out weigh~~ outweigh the ~~do~~ negatives.

Question 5 (a)

This question focussed on the work of the Post-Modernist designer Philippe Starck, with reference to his 'juice squeezer'. The question was designed to allow candidates to give their opinion of how they felt Starck has combined creativity and functionality in the design of the squeezer. Generally this question was done quite well with many candidates showing a broad knowledge of such things as form versus function, post-modernist philosophy and a small selection of Starck's work, other than the squeezer.

This question allowed candidates a wide variety of approaches. Some candidates just focussed on one aspect, e.g. shape and gave a number of valid points relating to this aspect. On the other hand, other candidates used a wide variety of points, such as shape, materials, and aesthetics in their answer.

The product is aesthetically pleasing in a new and unique creative way with its stream lined teardrop apperance and its modern material giving it a space age feel. The fact it stands high enough to have a normal glass, rather than a specific compenant is a example of where his creative design is also a key fuctional aspect. It is designed so that due to the teardrop shape the squeezed juice will ran down the shape and only land in the glass minimising mess which is ~~functionally~~ functionaly important but it also looks creative.

The Juice squeezer is a creative design which takes inspiration from streamlining and scifi (it looks similar to robots in war of the worlds) and considers fuctionality. It combines creative features such as the teardrop and height to ensure a fuctional and usable product that is desirable due to all the aspects.

This response covered a number of points and scored 3/6 marks for the following:

Aesthetically pleasing - too vague (0).

Streamlined (1).

Material giving space age feel - same mark scheme bullet point as 'streamlined' (0).

Stands high enough to have a normal glass (1).

Squeezed juice will run down into glass (1).

The final paragraph just repeats some of the above points – no more marks awarded.

It is very important in questions like this to exemplify. For example, the statement 'the squeezer is aesthetically pleasing' is just too vague. Examples of answers which scored a mark under this category were, 'the squeezer is aesthetically pleasing meaning it could be left on display rather than having to find cupboard space for it when not in use', or, 'the squeezer is aesthetically pleasing so could be used as a piece of art when not in use as a squeezer'.

- futuristic design (looks like a spaceship)   C
- 'teardrop', streamlined shape is functional   F
- high up from the surface - gives enough   F
  room to put a glass under
- could still be batch produced   F
- 'eyecatching' design, not like any other   C
- seeds?

Starck has made a futuristic design by giving the juice squeezer a 'spaceship' look - it is very simple yet which is perhaps why it also looks modern. The 'teardrop' shape makes it more streamlined, so the juice can run down the product straight into a container - the long legs mean that it is high up from the surface,

allowing room to put a fairly tall container or glass underneath. The design is eye-catching and could become a talking-point at parties etc. Not only does it serve its functional purpose, but it also looks good. The only problem, is that there is no way of separating ~~catching~~ seeds or pith from the juice before it gets to the container - the user may have to put a seive on top of the container to prevent this.

Question 5 (b)

This question focussed on the anthropometric considerations a designer should take into account when designing. It was designed to elicit answers which focussed specifically on anthropometrics, but far too many candidates responded focussing entirely on ergonomic factors. Whilst designers use both anthropometrics and ergonomics when designing and they are often intrinsically linked, many candidates still seem to mix them up or do not really know the distinction between them.

> when designing a product the designer should take into account things such as the weight of a person, but also things such as the hight, proportions of the body, reach of the arms and also the shape of the body.

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Examiner Comments

All the points made in this answer are just about size of the body, therefore only 1 mark was awarded.

a designer should design a product so that it fits with the physical dimensions of the 90 % of the population/market you are designing for. This is because you would be draw a distribution curve of the dimensions of all the people in a population, and ignore anyone smaller than the 5th percentile and ignore anyone bigger than the 95th percentile, as these people are the least common people. A designer could either design a product that fits only 90% of the population, or design a range of different sized products, for different sized people, or design a size-adjustable product.

(Total for Question 5 = 12 marks)

Question 6 (a)

This question was designed to elicit answers focussed on the key elements of a life-cycle inventory. This question elicited a wide range of responses, from full marks to those that lost marks because the responses were basically descriptions of what a life-cycle assessment is and not specifically what a life-cycle inventory is. Very few candidates made the points that this type of inventory is a 'management tool' used for mapping environmental/sustainability issues and is often presented in a graph/table/chart format.

Presents economic & environmental inputs & outputs of a product throughout it's life. Works out how much energy is consumed by the product and in the production of extracting the raw materials used. Works out a products carbon foot print.

ResultsPlus
Examiner Comments

This is a well structured response and scored 4/4 marks for the following:

Presents inputs and outputs.

Throughout its life.

How much energy is consumed.

Works out carbon footprint.

the key elements of a life cycle inventory are the overall effect a product will have on the environment now and in years to come. it also looks at the most effective way to produce a product so that it will have the least amount of impact possible. It makes sure that the product is as sustainable as it can possibaly be.

ResultsPlus
Examiner Comments

Unfortunately this answer only scores 1/4 marks for bullet point 8 in the mark scheme. This is because it lists this same point several times, just using different wording.

Question 6 (b)

This question was designed to get candidates to respond, using both positive and negative examples, to the question of recycling materials at the end of a product's life. The question elicited a wide range of responses and generally showed a good level of understanding from the majority of candidates. It is essential to give at least one positive or one negative response in order to score full marks (a totally one-sided answer can only score a maximum of 8/9 marks on this question).

Some candidates used a bullet-point structure for their response, which is perfectly acceptable, but it is important to make the bullet-points well constructed and to use correct technological vocabulary.

Some candidates used a table format to differentiate between positives and negatives. Again, it is important to make the responses in the table well constructed and to use correct technological vocabulary.

Some candidates chose to write using a more traditional sentence/paragraph structure. When doing this it is imperative to plan the response to avoid a totally one-sided argument (potential loss of a mark) and repetition.

Advantages
* Less raw materials going into landfill, reducing Pollution as the products start slowly decompose.
* Reduced need for of raw materials, reducing environmental damage by it from extraction
* Companies using recycled materials in their Products are able to target more environmentally aware customers, market themselves as being environmentally aware, increasing their reputation

Disadvantages

* Recycling materials can be energy intensive, most of which is provided by burning fossil fuels, which are incredibly polluting.

* New products cannot be made from 100% recycled materials, meaning new raw materials still have to be used in new products.

* Materials such as polymers can only be recycled a finite number of times before they have to be put into landfill

* Only certain materials within a product can be recycled, and if the product cannot be split into its component materials, the product has to go to landfill

8 The advantages of recycling include, the re-use of materials in order to produce products over and over using the same materials, causing less damage to the natural environment, because less resources have to be taken out. It costs less to re-use and recycle a material or whole product, than start again from scratch, allowing the world to be more sustainable.

The disadvantages include, the cost of transport of materials and sorting is high, because there are many materials that can't be recycled, due to thier harmful properties. following on, some materials when recycled can be seen as second grade, because they have gone through the recycling process which my have taken away some valuable properties of a materials.

To conclude the pros definitley out weigh the cons, because recycling provides a sustainable world.

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Examiner Comments

This is a reasonable response which scored 5/9 marks for the following reasons:

Less damage to the natural environment.

Less resources taken out - this is too vague for as there is no real recognition of the **finite** nature of **natural** materials (0).

It costs less to reuse and recycle material.

Cost of transport.

Cost of sorting is high.

Many materials cannot be recycled - repeat of earlier point (0).

Some recycled materials seen as second grade.

Taken away some valuable properties – repeat of earlier point (0).

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Examiner Tip

If an answer is well constructed it is not necessary to add a conclusion. The conclusion at the end of this response is short (many were quite lengthy) and actually contributes nothing more than a repeat of points already made.

Question 7

This question was designed to get candidates to respond, using both positive and negative examples, to the question of nuclear power as a means of supplying energy. The question elicited a wide range of responses which generally showed a good level of understanding from the majority of candidates. It is essential to give at least one positive or one negative response in order to score full marks (a totally one-sided answer can only score a maximum of 9/10 marks on this question).

Some candidates used a bullet-point structure for their response, which is perfectly acceptable, but it is important to make the bullet-points well constructed and to use correct technological vocabulary.

Some candidates used a table format to differentiate between positives and negatives. Again, it is important to make the responses in the table well constructed and to use correct technological vocabulary.

Some candidates chose to write using a more traditional sentence/paragraph structure. When doing this it is imperative to plan the response to avoid a totally one-sided argument (potential loss of a mark) and repetition.

7) Nuclear power is created using uranium rods which cause a chemical reaction. Uranium is a widly used material which is high abundent source. Due to the media and disasters caused by nuclear power for example chenoble there is a lot of misstrust in regards to nuclear power and a lot of uncertonty within the public there for having an impact on the nuclear powers reputation. As a large source of energy production nuclear power is a good contender as the amour- of pour that is produced is either low and would be able to produce and account for the energ that will be in demand. Although there are issues in relation to storage and

half lives of the material uranium waste which nuclear power can produce radioactive waste that would most certing need to be stored untill it is safe to remove How radio actu waste produced by nuclear pow Stations does have a half lip of mony years and would need to be stored Safely. and Security.

+ve	−ve
○ 24/7	○ people afraid to live near (chernobyl)
○ high energy yields efficient	
○ heat energy can be used to heat power station	○ radioactive waste is dangerous
	○ Hard to dispose of waste
○ not much waste	○ plants don't have a long life
○ uranium is highly available	time safety hazards
○ won't run out	○ workers bad.
○ low running costs	• high initial set-up cost
○ No CO_2	• near water supply

Electricity is produced through the splitting of a nuclear atom to provide heat used to turn turbine, this has many advantages and disadvantages.

Advantages:

- The process can run 24/7 there is very little downtime for the station.
- The process of nuclear power produces a lot of energy ~~so el~~ → electricity making it very efficient energy resource.
- There is little waste produced by this process; ~~makin~~ only fuel rods need to be disposed
- ~~After initial~~ Will pay off set-up costs quickly as makes a lot of electricity
- the heat is created from the process can be used to heat the power station, ~~save~~ instead of obtaining it from another resource.
- Uranium which is the fuel for a nuclear plant and is highly available; it won't run out.
- no fossil fuels or finite resources are used in making electricity
- The ~~process doesn't produce much~~ CO_2 emissions for nuclear power are very low ~~as they~~ which reduces impact of ~~fossil~~ on environment
- Low running costs

Disadvantages:

- The little waste that is produced is dangerous as it is still radioactive, making it hard to dispose of and a safety hazard for years after disposal.
- Plants don't have a long life they have to be

replaced often; new technology to improve.
- High initial set-up costs
- People dislike as there have been previous disasters (Chernobyl), unwilling to have them built
- The plants need to be situated near a water ~~supply~~ supply, to provide for the cooling systems.
- Workers are put at risk due to the radioactive material
- Need to be extremely safe due to nature of the material.

Paper Summary

Based on their performance on this paper, candidates are offered the following advice:

- Make sure you understand the trigger words in the question

- Avoid unstructured answers; the use of bullet-point statements even in extended evaluate type questions can help you to score better marks

- Questions will come from all parts of the specification so ensure that you have covered all the specification

- Make sure you know and use technical language where appropriate

- Use past question papers and mark schemes as part of your exam preparation

- Try not to write outside the allocated space provided in the answer booklet

- Think and plan before you begin to answer each question

- Take time to check if you have provided a justification or given an example in those questions which require it

- Make sure you do not repeat points in an answer.

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