# Advanced GCE Information and Communication Technology

## Unit G063: ICT Systems, Applications and Implications - High banded Candidate style answer

OCR has produced these candidate style answers to support teachers in interpreting the assessment criteria for the new GCE specifications and to bridge the gap between new specification release and availability of exemplar candidate work.

This content has been produced by senior OCR examiners, with the input of Chairs of Examiners, to illustrate how the sample assessment questions might be answered and provide some commentary on what factors contribute to an overall grading. The candidate style answers are not written in a way that is intended to replicate student work but to demonstrate what a “good” or “excellent” response might include, supported by examiner commentary and conclusions.

As these responses have not been through full moderation and do not replicate student work, they have not been graded and are instead, banded “medium” or “high” to give an indication of the level of each response.

Please note that this resource is provided for advice and guidance only and does not in any way constitute an indication of grade boundaries or endorsed answers.

**Section A**

Attempt all the questions in this section.

*These are learnt response questions; they are not contextualised although if the candidate was to give appropriate examples they would gain credit.*

| **1 State five stages of the systems cycle** **[1]** | |
|---|---|
| *Candidate style answer* | *Examiner's commentary* |
| Analysis<br>Design<br>Development<br>Installation<br>Testing | This is a list of the stages, nothing more.<br>**5 marks** |

| **2 Describe the user interface design tool known as the ‘Model Human Processor’.** **[4]** | |
|---|---|
| *Candidate style answer* | *Examiner's commentary* |
| This is where the stimulus is captured, this can be sound or vision. This is decoded, cognitive elements, including memory, are used and a response formulated. This is initiated as a motor response – physical movement. | This is a learnt response. An example could be used and this would also gain the marks.<br>**4 marks** |

**3(a) Describe the characteristics of a virtual network. [4]**

| *Candidate style answer* | *Examiners commentary* |
|---|---|
| A network is a group of computers connected together for the purposes of communication. A virtual network is created by combining physical computers together into a network that does not run on isolated cables. The network may join computers together from different sides of the world in a virtual network, allowing them access to resources that could otherwise not be available | There are two definitions of virtual network, the use of either in the answer is acceptable. The description requires two elements with detail given<br>**4 marks** |

**3(b) Describe how a mobile satellite phone network operates. [4]**

| *Candidate style answer* | *Examiners commentary* |
|---|---|
| Phone has a line of site to the satellite where the signal is sent from the phone to the satellite. The signal is then bounced between satellites until it finally gets sent back down to a base station. This base station is connected to the land based phone network and forwards the call to the phone. | This is a learnt response. The line of sight is important. The end result can be from satellite phone to satellite phone or into the phone network.<br>**4 marks** |

**4(a) Explain the importance of standards for communicating between devices. [2]**

| *Candidate style answer* | *Examiners commentary* |
|---|---|
| Different standards means that the data may not be able to be communicated or, if it can be it may not be correctly interpreted. | This is a short question, it is after the importance of standards. Two points need to be made.<br>**2 marks** |

**4(b) Describe the characteristics of an intranet. [2]**

| *Candidate style answer* | *Examiners commentary* |
|---|---|
| An intranet is an internal Internet. Authorised users, usually from a company or organisation are allowed access, it is restricted by the use of passwords and usernames. | This requires a straight definition of an intranet.<br>**2 marks** |

| **5(a) Explain what is meant by an expert system and describe its components. [4]** | |
|---|---|
| *Candidate style answer* | *Examiners commentary* |
| An expert system is a computer system that replicates the facilities of a human expert by having a repository of knowledge and uses artificial intelligence to find an answer.<br>The components are: knowledge base which is the final answers, inference engine which is the set of rules leading to the answer and user interface which is the method used to ask and retrieve the answers. | There are two parts to the answer – what is an expert system and description of the three components.<br>**4 marks** |

| **5(b) Identify one other way, apart from expert systems, in which ICT assists operational and strategic decision making. [1]** | |
|---|---|
| *Candidate style answer* | *Examiners commentary* |
| Management information systems present information and can deliver trends and suggest possible courses of action, both short term (operational) and long term (strategic) | This is an identification but requires some more information than a single work.<br>**1 mark** |

| **5(c) Identify three internal resources of a system. [3]** | |
|---|---|
| *Candidate style answer* | *Examiners commentary* |
| Three internal resources are human, technological and accommodation. | These are three straight learnt responses.<br>**3 marks** |

| 6 | **Discuss the advantages and disadvantages of implementing a solution using off-the-shelf software rather than producing custom-written software.** **[6]** | |
|---|---|---|
| | *Candidate style answer* | *Examiners commentary* |
| | The main advantage of off the shelf is its availability. It is possible to go into a shop, purchase the software and have it up and running within a few hours. This will enable to company to fulfil the requirements straightaway and begin to be benefit from the software. Custom written takes time to write and it could be months before it is ready to use. This time difference allows the company to get a head start and begin to reap the benefits. | This is an advantage, discussed. |
| | The off the shelf software has a very large user base. This has two important advantages. The first is that there will be a large amount of support available. If the company has a problem they with be able to access books, Internet help groups and individuals with expertise. This will give them a range of options and allow them to select the most appropriate and cost effective solution. The help will be available when they want it and at the price they want because of the competition. This will not be available with custom written – the support is likely to only be available from the developers and this will be on their terms – time and cost. | This is an advantage discussed. |
| | The second advantage of a large user base is that there is a large number of people who can be involved in the testing. Where you only have a small number, or even one, user the testing is limited. Large numbers can report bugs and errors and this can be fixed. This ensures a robust, usable application that the end users can have confidence in using. | This is a continuation of the above point but a different advantage. |
| | There are some disadvantages – it is likely that the final application will not do exactly what you want it to do and there needs to be some compromise. Not all the facilities you require will be there and this will require workarounds and other solutions which decrease the benefits, make the system more complicated to use and reduce the confidence of the end users. | A discussion requires a balanced approach, this means advantages and disadvantages. This is a disadvantage. |
| | An off the shelf system will contain many features that you do not require. You will be spending money on features you do not need and never use. There is a knock on effect as well, these features, when installed, take up hard drive space and this reduces the amount of space required for other | This is a second disadvantage |

| | |
|---|---|
| applications and data. It may even lead to money having to be spent on new hardware.<br><br>Overall, there are advantages and disadvantages. The immediacy of availability and choice of support are very important. They are, I think, outweighed by the fact that the system may not do what it is required to do. Meeting all the requirements is paramount and a system that takes time to arrive but is all singing and dancing is better than a system that is available now but has gaps. | Although a conclusion is not required for full marks, this is always useful as it ensures a balanced argument.<br><br>Overall, the essay contains both advantages, disadvantages and a conclusion. It is higher band.<br>**6 marks** |

**7 The British Computer Society is one example of a professional body associated with ICT.**

**(a) Describe the purpose of such a professional body. [3]**

| *Candidate style answer* | *Examiners commentary* |
|---|---|
| The purpose of the BCS is to represent the views and needs of it members to government and other public and private bodies with an interest in ICT/Computing. It is there to set a framework for good practice and qualifications for its members. It offers special deals and access to resources, such as book libraries and reports to help its members keep up to date in their field. | This is a learnt response on the purpose.<br>**3 marks** |

**7(b) State one advantage and one disadvantage of belonging to such a body. [2]**

| *Candidate style answer* | *Examiners commentary* |
|---|---|
| Advantage: They will receive regular communications including updates on their profession.<br>Disadvantage: It is expensive to join and can become restrictive – must belong to get a job. | This is a state response.<br>**2 marks** |

**Section A Total [40]**

**Section B**

Questions 8-14 concern a company which produces gardening tools such as spades, forks, rakes, hoes and wheelbarrows.

*This part of the paper requires contextualisation of the answers from the candidate.*
*Attempt all the questions in this section.*

**8(a) A company is to create a stock control system to help in their factory producing gardening tools. The systems analysts produce a requirements specification and a design specification.**

**Describe the contents of:**

**(i) the requirements specification [4]**

| *Candidate style answer* | *Examiners commentary* |
|---|---|
| A list of objectives that the finished system will contain agreed by the management which forms a contract.<br>The agreement will also contain timescales when it needs to be delivered and a cost of producing the system. | This is a question that ties in with G064 and their experience of the project. Identification of the contents is all that is required, at least 4.<br>**4 marks** |

**(ii) the design specification [4]**

| *Candidate style answer* | *Examiners commentary* |
|---|---|
| *This will contain the hardware and software that are required to run the end system on. It will also contain data structures, input forms, query designs and report layouts.* | This is a question that ties in with G064 and their experience of the project. Identification of the contents is all that is required, at least 4.<br>**4 marks** |

**(b) The analysts decide to use a project planning tool to help them with this project. Identify and describe one tool available for project planning. [3]**

| *Candidate style answer* | *Examiners commentary* |
|---|---|
| They could use a Gantt chart. This is a tool that shows the start and end dates and the duration of tasks. It can show how tasks overlap. | The description of the tool must match the identification. There is one mark for the identification and two for the description. Without the identification no marks can be awarded.<br>**3 marks** |

**9** **The company already uses both batch and real-time processing systems.**

**Discuss the differences between these two types of processing giving examples of how the company might use each system.**

**The quality of your written communication will be assessed in the answer to this question.** **[9]**

| *Candidate style answer* | *Examiners commentary* |
|---|---|
| Real time is where the information is processed as soon as it is received. It has an immediate effect on the information. Batch processing is where the information is collected, collated and at a pre determined point in time, processed.<br><br>The accuracy of requested information is one difference between the two systems. With real time systems, the information is updated immediately and any updates immediately applied. With batch the update is only applied at a given time. The point in time from which the update has been received and it being applied, the information is out of date and incorrect.<br><br>Batch processing can be used for wage calculations which happen each month, it can also be used for sending advertising literature and producing statements which can be done at night during low processing times. Real time is needed for stock control and payments where it is important to have accurate up to date information.<br><br>The timescale is another difference. Real time is carried out immediately, regardless of when it is. Batch processing takes place at regular intervals, usually at night when the processing power is not being used. | This particular question is an extension of the comparison – it is necessary to identify a characteristic and then investigate how that feature applies to batch and real time.<br><br>It starts with a general introduction to both of them as there is a comparison in the nature of the description itself.<br>**9 marks** |

**10 The company already has networks of computers in place between the offices, the factory floor and the warehouse.**

**(a) The offices use a peer-to-peer network. Management would like the whole company to go onto a client-server system.**

**Describe the advantages and disadvantages of each system to the company. [6]**

| *Candidate style answer* | *Examiners commentary* |
|---|---|
| Peer to peer – the advantages<br>The system is relatively inexpensive to set up especially if only a few machines are being networked. There is no need for a specialist network manager or expensive switching equipment or servers. This will reduce expenditure to the company allowing them free to spend the money in other areas that will benefit the company.<br>Peer to peer – the disadvantages<br>If resources are shared then the machine with the resources required will slow down when accessed. You can be using the machine but if others need its resources, as a print server for example, then the user will suffer, their work will suffer and this will impact on the company as targets will be missed. The number of connections between machines is limited and it is not suitable for a large network. If the company expands then it will find it difficult to increase the network size, it will need to completely redevelop it.<br><br>Client – server – the advantages<br>There is a central control point for updates to anti virus, backup, software installation and security. The computers can be standardised and a central logon created. The network can grow as required without compromising the individual computers. The company can have more control over the computers and the users.<br>Client – server – the disadvantages<br>Technical expertise is required to set up and maintain the network, a network manager is likely to be required. This will cost money and take resources from elsewhere in the company. If there is a reliance on central equipment, such as the server or switching equipment then if it fails the employees and the company will suffer as work cannot be done and revenue will be lost. | This is a description of the advantages and disadvantages of peep to peer TO THE COMPANY. It is necessary that there is some contextualisation.<br><br>This is a description of the advantages and disadvantages of client server TO THE COMPANY. It is necessary that there is some contextualisation.<br><br>There are four elements to this question and all need to be covered to gain the marks.<br>**6 marks** |

**(b) When the goods leave the factory warehouse the drivers of the lorries use a Global Positioning System (GPS) to help them reach their destination.**

**(i) Describe GPS. [2]**

| *Candidate style answer* | *Examiners commentary* |
|---|---|
| GPS is a system which uses satellites and a receiver. A device on the ground, with an unobstructed view of the sky/satellite receives signals from the satellite. It uses this information and maps within it to pinpoint the location of the lorry on the surface of the planet. | This is a textbook description of how GPS works. There must be a minimum of two elements.<br>**2 marks** |

**(ii) Describe how satellite communications systems are used to enable GPS. [4]**

| *Candidate style answer* | *Examiners commentary* |
|---|---|
| The GPS satellite sends data about its location and the current time. The signals from different satellites arrive at the receiver at very slightly different times. This is because the distance of the satellites is slightly different. The GPS can determine its position by the location data and the timing –the difference in time it receives the signals from the satellites. It needs signals from at least four satellites to get an accurate position. | This is a description of how GPS works, but it must be focused on the use of the satellite in the process.<br>**4 marks** |

**(c) The drivers are also able to communicate with the company network using Bluetooth ® technology.**
**Describe Bluetooth ®. [2]**

| *Candidate style answer* | *Examiners commentary* |
|---|---|
| Bluetooth is a wireless protocol that works over a short range from a fixed or a mobile device, such as a phone, that allows the creation of wireless personal area networks. | A straightforward description of Bluetooth<br>**2 marks** |

**11 Some of the employees who work in the factory will need to be trained to use the computers.**

**(a) A firm of consultants is employed to decide what methods might be best for training.**

**Describe different methods of dialogue that the consultants might have considered including interaction between computer and person. [5]**

| *Candidate style answer* | *Examiners commentary* |
|---|---|
| Different methods of dialogue include forms, speech and text. Forms dialogue includes boxes for the user to fill in and form controls such as option buttons, drop down lists and spinners. These can be validated to restrict data entry. They are useful for non experienced users as they direct the user to areas of the screen to fill in and can give help messages, instructions and pointers. A speech dialogue interface involves the user talking to the computer, usually with a reduced command set. Open dialogue uses voice recognition software to identify the words spoken. A speech dialogue does not require keyboard training and can be made to fit natural language of the user. It does require a quiet environment and may make the end user self conscious. The computer can also response with speech and noises. Text dialogue involves the user typing commands, usually at a prompt. This is usually reserved for expert users as the command set needs to be known. | This requires identification of the methods and a description of the methods. There should be some indication of suitability of the methods as well.<br>**5 marks** |

**(b) The training will help the employees to adapt to the new methods of production that the management of the company is thinking of introducing.**

**Explain ways in which software based training methods can be used to help employees cope with changing work practices. [4]**

| *Candidate style answer* | *Examiners commentary* |
|---|---|
| Computer Based Training can be used so that the employee can go through the new system at their own pace and even at home. This will prevent any embarrassment they may have about their ICT skills. Different methods are used – text, video and sound and modules of the training can be repeated as often as required. There are also interactive tests which give instant feedback. There is also monitoring of progress and if they get into difficulties over a section the management can see this and engage a human trainer to help on that issue. The software can give an idea of what the end result will be and help them build up confidence using the software. They can make errors without it affecting the system. | This requires identification of the method and then an investigation into how that particular method helps the employees.<br>**4 marks** |

**12 The company is expanding and will soon have branches overseas. They consider**

**having their database system distributed across the different company sites.**

**(a) Explain three different ways in which distributed databases can be stored in more than one physical location. [6]**

| *Candidate style answer* | *Examiners commentary* |
|---|---|
| The entire database could be duplicated across each physical location. Every one at each location has access to all the data.<br>The database could be held centrally with an index being sent to each physical location. Only the data that they need to access is then transmitted to the location and any updates and changes are immediately transmitted back to the central location.<br>The data could be horizontally or vertically partitioned. In horizontal partitioning is where each physical location gets all the fields but not necessarily all the records. A location in Scotland will only get customer records from Scotland whilst Kent will only have the south east records. | This is theoretical – three different methods need identifying and additional information given.<br>**6 marks** |

**(b) Explain security issues of distributing the databases and methods of overcoming these issues. [6]**

| *Candidate style answer* | *Examiners commentary* |
|---|---|
| One key problem is physical access to the data. If the data is stored in more than one location this gives additional entry points to the system for individuals. There is a need to physically secure the system, this can be done through the use of cameras and guards.<br>There is a problem with viruses these can delete data or transfer it to the public domain. The system needs to ensure that all data being sent, all data received and all data stored are subjected to virus checks.<br>Hackers are a danger, with the increase in traffic it becomes easier for them to hack in and retrieve data. There are now multiple points of access. The company needs to ensure all software is patched, staff are training on the use of passwords, audit records are regularly checked and access levels imposed. | These should be linked to the methods given in (a) however, any distribution will contain these security risks. There are two parts to the question, the security risk and how it can be overcome.<br>**6 marks** |

**13 A new computer-based system is to be installed in the warehouses of the company to help load goods onto lorries more efficiently.**

**(a) Describe two different methods the company could use to install this new system.** **[4]**

| *Candidate style answer* | *Examiners commentary* |
|---|---|
| Parallel could be used. This is where the old and the new system are run together for a period of time. The results from the two systems are compared to make sure that the new system is working correctly. Once there is confidence in the new system the old system is stopped.<br>Direct could also be used. Direct is where the old system is stopped and immediately the new system is introduced. | This is a description of two different methods.<br>**4 marks** |

**(b) Explain three different types of maintenance required during the life of this system.** **[6]**

| *Candidate style answer* | *Examiners commentary* |
|---|---|
| Adaptive maintenance is required if there are changes in working practices, this could be legal changes, equipment changes or changes within the company.<br>Corrective maintenance is the repair of any bugs in the system. These are bugs that have been left in from development and were not picked up during testing.<br>Perfective maintenance is improving aspects of the system – new search algorithms that could be used to speed up a search or moving a commonly used option closer to the main option. | This is identification of the three types of maintenance with further expansion.<br>**6 marks** |

**(c) Describe two factors which should be considered when managing this change.** **[2]**

| *Candidate style answer* | *Examiners commentary* |
|---|---|
| The most important is staff capability. This is making sure that there is appropriate training for the staff so that they will be confident when using the new system. Training them will also reassure them that their job is safe and they will be needed for the new system.<br>Gaining the staff views and opinions is important. This gives the staff an ownership of the system and makes them less resistant to change. Involving the staff through meetings and comments gives them an input into the | This is the support during the changeover. There is some overlap between changeover during the SLC process and the support during installation.<br>**2 marks** |

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| change. | |

**14 Discuss hardware and software developments which may change the way the company runs in the future. You should consider the sales force, warehouse workers and factory production methods in your answer.**

**You should not limit yourself to existing systems and the way in which they could be advanced but allow an imaginative approach given possible trends and directions of hardware and software development in the future.**

**The quality of your written communication will be assessed in the answer to this question. [13]**

| *Candidate style answer* | *Examiners commentary* |
|---|---|
| There is some scope for development in the delivery system. The computers could be used to plan and plot delivery routes making the best use of fuel, traffic accidents and timing. The company could link the GPS system to an automated driving system. This would allow the vehicles to follow the route and drive for longer hours as the computer system would not get tired. There would be less accidents and this would have an impact on insurance premiums and disrupted delivery schedules increasing customer confidence. | This is partly already in place and a potential new development that is not commercially available. |
| The customers could use a 3D modelling system combined with virtual reality to look at the products before they buy them. They could see them in 3D, rotate them to see all sides and sizes before ordering. This increases the likelihood of the customer wanting the product when it arrives and less time for the company or collecting unwanted objects and repackaging them. | This is a different aspect of the company. The new development is linked to changes to the company. |
| The human element could be completely removed from the process – the order is completed online, the selection then done from the warehouse by robots and the packing done through an algorithm to determine the most cost effective and use of least packaging to wrap the purchase. This is then transferred to the vehicle and delivered. The removal of the human element means that work can continue 24hrs, there is no sickness or time off and each action is completed the same as the one before, there is no difference in service. | This is a change in work practices |
| The use of virtual reality and networking means that if employees are required in the warehouse, to drive the vehicles or pick items, then they could in fact be at home in a VR immersion suit which gives them the impression of being at work. They could do their job by controlling a robot. This has advantages of getting more work from the employee as there is no travel time and allowing them to spend time with their family which makes them happier and more likely to enjoy their work – overall a better employee. | This is an impact on the staff working in the company and a subsequent affect on the company itself. |
| If there are robots and no human presence in the warehouse the lights can be turned off, no windows | |

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| needs to be included in the building and the location can be anywhere as workers are not required there everyday. The heat can also be reduced. Whilst this has an environmental impact y using less fuel, it also reduces costs in the building, the heating/lighting and the cost of land for the location.<br>There is a problem with the reliance on technology. If it was to go wrong then it can make some large mistakes – customers getting the wrong orders, vehicles crashing and injuries as a consequence. There needs to be an increase in the maintenance personnel and the maintenance budget to ensure the smooth running and it is not possible to guarantee that the software has no bugs. Therefore there cannot be complete confidence in the system.<br>Overall, the advantages of computer control seem to be of benefit, reducing costs but underlying this there is the cost of investment, maintenance and the large problems when things go wrong. There is a degree to which the human element can be removed by advances in technology but it cannot go to far. | This is generic disadvantages applying to all developments.<br>This is an impact to the company and the way it operates.<br><br>This is a weak conclusion – although not necessary for full marks it does help focus the argument.<br><br>Overall, it covers new technology and its impact on the company and employees, including changes to the way the company runs. There is also some negative impacts on the reliance and use of new technology. Higher band<br>**13 marks** |

**Section B Total [80]**