GCE MARKING SCHEME

SUMMER 2016

INFORMATION & COMMUNICATION TECHNOLOGY

IT3

1243/01

INTRODUCTION

This marking scheme was used by WJEC for the 2016 examination. It was finalised after detailed discussion at examiners' conferences by all the examiners involved in the assessment. The conference was held shortly after the paper was taken so that reference could be made to the full range of candidates' responses, with photocopied scripts forming the basis of discussion. The aim of the conference was to ensure that the marking scheme was interpreted and applied in the same way by all examiners.

It is hoped that this information will be of assistance to centres but it is recognised at the same time that, without the benefit of participation in the examiners' conference, teachers may have different views on certain matters of detail or interpretation.

WJEC regrets that it cannot enter into any discussion or correspondence about this marking scheme.

INFORMATION & COMMUNICATION TECHNOLOGY - IT3

MARK SCHEME - SUMMER 2016

Q.	Answer	Marks
1.	***Needs of the user*** • The novice user's priority will be ease of learning/intuitive (1) • The expert user will want to get the job done in the shortest possible time (1) ***How these could be met (Max 3 marks)*** • Could provide tutorials for novice users / Novices will need easy access to help • Step by step approach / novice users should never be left wondering what to do next / wizards • Novice users tend to stick to the mouse/touch screen / Graphical user interface (gui) • Novice user will need clear navigation structure / colour scheme making it easier to use i.e. showing routes through a program (hyperlinks) • Provide shortcuts for experts / command line interface • Experts often type at high speed and can memorise key combinations/commands (1) and this is faster than using the mouse and clicking on icons or going through a series of windows • An expert can customise the interface to suit their needs • Increased numbers of ways of performing the same operation – interfaces have a number of routes and allow the user the choice, i.e. a novice user would prefer to use a drop down menu or click on an icon to print whilst an expert will want to use CTRL/P **Must be clear that answer refers to novice or expert and not general points about HCI.**	2 3
2.	**1 mark per point (have to state need and how helped) to a maximum of 4 marks** • Visually impaired people can have their screens configured using large fonts. • Magnify areas of the screen for people with poor eyesight. • Visually impaired people can also use special Braille keyboards to enter the data and can use Braille printers to produce output which other blind people can read. • Visual messages on screen instead of sound for the deaf. • Use of correct colour schemes for colour blind people. • Use large mouse or trackerball for people with poor co-ordination. • Blow pipes (sip and puff switches) or eye movements for entering text controlling devices for those who cannot use their arms, etc. • Brainwave controlled devices for physically handicapped with no arm/hand movement. Condone example of not using frames or patterned backgrounds, or DDA requirements for comments attached to images for blind users Paralysis should be of upper body or total Dyslexia if well argued – colour paper plus why Other examples might be given - Accept any suitable point.	4

Q.	Answer	Marks
3.	**3 x (1 mark for giving <u>each factor</u> and a 2nd mark for a fuller description)** NOT size or cost to organisation **How the system will be used** • What type of <u>applications</u> do users require? / Are the users going to require a wide range of applications? • Will they need large <u>data storage</u>? / Are they going to store a large number of data files? • From <u>where</u> will they operate the network e.g. at home in office or remote access from different locations. / Where does the processing get done? **Existing systems to integrate** • More often networks are not developed from scratch but need to fit in with existing systems. • Sometimes an extension is required e.g. when a new branch office opens. • Therefore any new network must fit in with the existing operating systems and protocols. • It must support any peripherals already in use, e.g. bar code readers, printers, etc. • Can the current stock of PC's be used on the new network? **<u>Performance</u> in terms of: reliability / user friendliness / capacity / speed of processing** • Different parts of the organisation may have different performance requirements. • Real-time e-commerce system may require greater speeds / capacity / reliability. NOT just 'faster networks' **If candidates only list factors then maximum mark is 1** **Condone security** if reference to level of risk (value of data) NOT just hacking / viruses	3x2

Q.	Answer	Marks
4.	**Answers must mention both ring and star topologies making relative comments for each mark. (i.e. cannot make 6 ring points)** **No marks for the candidate using the term fault tolerant but can get the ring disadvantages** Indicative content: These points could be made but must be related to each topology. ACCEPT THE OPPOSITE OF ANY OF THESE POINTS BUT NOT TWICE **Advantages of ring** • Each computer has the same access as the others so no one computer can hog the network. • Higher transmission speeds / Data flows in one direction only (so large volumes can be transmitted). • No collisions. **Advantages of star** • Load tolerant – extra computers can be added without much loss in performance because all computers have their own path to the server. • Easy to add extra computers – extra computers can be added without disturbing the network. # • Different speeds are possible on different spokes/ arms of the network. **Disadvantages of ring** • Faults are difficult to locate. • It is impossible to keep the network running whilst equipment is added or removed because there is only one path for the data to follow #. • Break in cable and network won't work*. **Disadvantages of star** • Higher cost – the large amount of cabling needed makes it more expensive. • Dependence on the central server/hub. ACCEPT THE OPPOSITE OF ANY OF THESE POINTS BUT NOT TWICE i.e. an advantage of a ring can be a disadvantage of a star e.g. only give one of the two # N.B. Do not accept points which are really about peer to peer or client server networks	6
5.	**One mark for what it means** Distributed computing - a series of computers are networked together / virtual supercomputer each working on solving the same problem / a problem / one problem (1) **One mark for a basic description of an application with further mark for expansion with more detail x2** ***EXAMPLES*** The purpose of the SETI *(Search for Extraterrestrial Intelligence)* project is to search for intelligent life outside the Earth (1) and to do this a radio telescope is used.(1) In order to search for the narrow-bandwidth signals lots of computing power is needed. (1) *Popular Power project: helping to develop flu vaccines (1)* *Folding@home project on consoles: Alzheimers' research (1)* *For these other projects, second mark is for more detail.* ***NB No mark for just naming application (i.e. just SETI)***	1 2 2

Q.	Answer	Marks
6.	**Two advantages and two disadvantage for full marks** ***Advantages of distributed computing*** • Reduces cost because an expensive powerful computer such as a supercomputer is not needed • Can pass work to computers anywhere in the world using the Internet • Improved performance as each computer can work on part of the data • To get more processing power you just need to add more PCs ***Disadvantage of distributed computing*** • Issues with the security of data spread out on so many different computers/ locations • Heavy reliance on networks or communications which may not always be reliable • Increased costs owing to the use of expensive communication lines	2 2
7.	**Any four of the following, discussed in suitable detail:** **Not order tracking or email confirmation** • Maintaining a company website / need for trained staff. • Catalogue of stock/products, stock database/table so that one can immediately see if something is available or whether there will be a delay. • Methods of secure payment / shopping trolley. • Database/table of customer orders/bids so that immediate searches can be made to find and update customer information. **If candidate just states four points then maximum mark is 1**	4
8.	**Two advantages and two disadvantages** **Advantages** • Can access e-mail on the move (whilst travelling) / use the internet on the move (or other concrete example) • Can work more productively because you can do things immediately, without having to go back to the office, more flexibility of where you work. • Can easily modify your plans – flights, trains, hotels. • Increase in real time collaborative working / voice conferencing / video conferencing. **NOT the phrase 'work from anywhere' as this is too vague** **Disadvantages** • Affects home / work balance. • Can be very expensive if use a mobile phone for the access. • Many black spots / poor connectivity. • Increased security problems from hacking. • Battery life on mobile devices. • Network overload at peak demand. • Some attachments cannot be opened / worked on. • Work progress hampered by distractions. **NOT** loss of device through leaving on a train, etc **NOT** saving travel costs	2 2

Q.	Answer	Marks
9.	**Any 6 relevant points (Possible content below)** For • If someone has been wrongly accused of a crime and found not guilty, they still have to live with the stigma and search results pointing to original crime is just a reminder. • Should minor crimes committed as a juvenile haunt you for ever?/ should silly photos taken when young stop you getting a job/ do employers have the right to stop you doing things • Financial problems (declared bankrupt) which you have overcome. Against • Should a politician be able to erase details from his past • Professional aiming to hide bad reviews. • Society might want a true picture of the individual WHY • Length of time information has been there- may not be relevant • Not wanting others to see private data/ information posted without permission / invasion of privacy if qualified • Job prospects may be affected • Accuracy of published information- could be telling lies/social impact • Privacy Issues :- could lead to cyber bullying / stalking / grooming/identity theft • May get bad reviews/criminal case history so want it removed to disguise facts. CONCERNS • Worldwide so can get at it from other websites in different countries • Might not remove all links to it and still sits on server • How long does it take /how do you get it removed • Any costs involved • Censorship- companies/individuals may try to suppress/restrict access to information public has right to know/ freedom of information General Points • Ruling seen as a right to be forgotten • Came about because an individual took it to law to remove an 18 year old story about having his home repossessed due to financial difficulties. He claimed that the search results violated his privacy • EU citizens can ask for links to be removed if the content it directs people to is deemed “inadequate, irrelevant or no longer valid”. • Content not deleted from the website, just the link to it, making it harder to find. • Case originally dismissed as requesting search engine providers to supress legitimate and legal information that has entered the public domain as an interference of freedom of expression • Start of censorship in Europe. • “Same as going into a library and pulping books”. • Initial flood of requests to have links removed • Don’t have to remove link if in public interest (1), but who decides what is public interest? (1) • Whole system tied up in red tape. • Publicising address and robberies occurring Any reasonable answer	6

Q.	Answer		Marks
10.	**(Item 1 mark and problem 1 mark) x3** **NB candidates can mix and match the problem answers but do not award duplicates but if no example cannot award problem.**		3x2
	Example	**Problem**	
	Responsibilities of the employee to abide by company rules	Don't take laptops on trains and lose them/play games By logging off workstation in company time/ personal use of email/misuse of company printers/misuse of company mobile phones	
	Respecting rights of others	No cyberbullying or abusive emails	
	Abiding by current legislation	e.g. Data Protection Act, Equal Opportunities Act, Computer Misuse Act, Copyright Act etc. - *don't sell confidential information about customers on to rivals*	
	Authorisation and permissions on data access:	What the employee can and can't do to data	
	Security of data	Don't disclose passwords, personal use of email logging on and off procedures, encryption of transferred data etc.	
	Protecting hardware and software from malicious damage	By logging off workstation and locking doors/ not downloading viruses	
	Complying with licensing agreements	Don't copy software onto home computers/ keep to correct No of copies	
11.	**One mark for each factor and one for each further explanation x 3** **Context must relate to a Financial company or be neutral** **Likelihood of risk occurring** - some thigs such as power cut are inevitable but explosions much less likely - senior managers have to assess the likelihood of each risk occurring and put in the necessary security **Short and long term consequences of threat** - resources (staff, equipment, etc) need to be directed towards recovering the data / may have to pay compensation / financial loss due to loss of business through not being able to sell mortgages, loans etc. / embarrassment/ prosecution / loss of integrity / bankruptcy / cost of replacing equipment **How well equipped is the company to deal with the threat** (What procedures are in place) - has to be reviewed periodically because of changing needs - disaster recovery programme - backup strategy - cost (how much they are prepared to spend), use of firewalls - use of anti virus **NB Should not be talking about Health & Safety**		3x2

Q.	Answer	Marks
12.	**Any 4 of the following (answered in sentences)** **Factors which can lead to poor MIS** • Complexity of the system. • Inadequate initial analysis. • Lack of management involvement in initial design. • Inappropriate hardware and software. • Lack of management knowledge about computer systems and their capabilities. • Poor communications between professionals. • Lack of professional standards. **Any 4 of the following (answered in sentences)** **Factors which make a good MIS** • Accuracy of the data. • Flexibility of data analysis. • Providing data in an appropriate form/format. • Accessible to a wide range of users and support a wide range of skills and knowledge. • Improve interpersonal communications amongst management and employees. • Allows individual project planning. • Avoids information overload. • Allows speedy decisions for urgent situations **NOT** up to date. **If just a list then award a mark for every four to a maximum of two**.	4 4

Q.	Answer	Marks
13.	**6-8 marks** **Candidates give a clear, coherent answer fully and accurately describing four features or processes. They use appropriate terminology and accurate spelling, punctuation and grammar.** **3-5 marks** **Candidates briefly describe features or processes, but responses lack clarity. There are a few errors in spelling, punctuation and grammar.** **1-2 marks** **Candidates simply list a few features or processes or give a brief description of one. The response lacks clarity and there are significant errors in spelling, punctuation and grammar.** **0 marks** **No appropriate response.** **Indicative content** **features/processes (4x1), further detail/expansion (4x1)** • **Creating the design specification for softwar**e • **Design of processes** – queries, macros, calculations, validations • **Design of output** - reports / specialist documents such as invoices, payslips, etc. • **Design of data and file structures** that will allow a useable system to be built. This will include the design of fields and table structure for a relational database. • **Design of information systems** that will allow users to get relevant information out of the system, which will allow them to make appropriate decisions. (DFD's / ERD's) • **Design of networks and transmission issues** such as topology, type of cable, protocols, etc. • **Personnel issues**. Staff will need training and departments reorganising, skill level of the user • **Security processes and procedures** i.e. registering with the Information Commissioner, where data is stored, access levels, design of backup procedures, etc. • **Design of House style/ethos** **Can still get example mark if factor not there.**	4x2

Q.	Answer	Marks
14.	(**1 mark for fear and 1 mark for explanation of why) x4** • **Fears of redundancy with lost jobs.** Less staff are often needed to do the same amount of work once computers are introduced. / New system may replace staff who performed manual processes e.g. filing, etc. • **Change in work patterns** - split shifts or change of hours or night work, 24/7. • **Fear of reduction in status and job satisfaction**. Management Information systems means less middle managers are needed so departmental heads may lose power./ Data warehousing means all data is stored centrally and is available to all some departments who used to be asked for the information are downgraded in status. • **Change in internal procedures** - may make staff take on extra responsibilities for no extra money. • **Fear of Retraining/Fear of looking ridiculous**. Established staff members may feel their lack of ICT skill and knowledge may make them look incompetent. • **Changes in location/Organisational structure**. Office space requirements are reduced so need smaller premises with reductions in rents, rates, utility bills. /New premises may not be in original location causing problems with journeys to work. / Sometimes they are relocated to different cities which could lead to either loss of job or relocation expenses. E.g. some jobs may go abroad to call centres /breaking down friendship groups. • **Fear of Health risks** from working more with computers, back problems etc.	4x2

Q.	Answer	Marks
15	**2 out of the following covered. Mark comes from example and only one from each category** BACKUPS • Onto external devices DVD/USB etc • RAID • Offsite • GFS for batch processing • Safe storage of important files stored on removable discs e.g. locked away in a fireproof and waterproof safe • Disc portioning ACCESS RIGHTS TO CHANGE DATA • Read only/write protect CHECKS ON TRANSMITTED DATA • Check bits/parity checks • Description of odd or even parity • A common type of error that occurs during data transmission is that a bit is swapped from a 0 to a 1 or a 1 to a 0 by electrical interference. Parity checks this type of error. • If total of 0's and 1's on transmitted and received data does not match then an error must have occurred. A request will be sent to the transmitter to ask it to send the byte again. DON'T OPEN UNKNOWN EMAILS • Could contain malware TRAINING • To use correct procedures and make less mistakes ADVANCED VERSION FEATURES AND TRACKED CHANGES FEATURES ON WORDPROCESSORS • Avoid losing data by accidentally deleting data and saving it. • After the document is saved, the portions that are changed or deleted are lost unless you've enabled features that will store changes for you. PROTECT AGAINST POWER SURGES WITH AN UPS • An un-interruptible power supply protects your computer and data during a power failure. • The spare battery in the ups gives you ample time to save your documents and shut down windows properly so that you will not lose any files or damage any hardware components.	2

<table>
<tr><th>Q.</th><th>Answer</th><th>Marks</th></tr>
<tr><td>16</td><td>4 out of the following covered (1 for method and 1 for extension)x4
Can get extension mark if method not there
METHOD

<table>
<tr><td>CONTROL OF ACCESS TO SERVER/DATA ROOMS</td><td>• E.g. Retina scans to access rooms/ locking the building,/access to computer rooms etc.</td></tr>
<tr><td>PHYSICAL PROTECTION OF HARDWARE AND SOFTWARE</td><td>• E.g. fireproof box / fill rooms with non-flammable gas at night.
• Locks on rooms/doors (Not twice)
• Guards on rooms or entry ways</td></tr>
<tr><td>ENSURE ACCESS TO WIRELESS NETWORKS IS SECURE</td><td>• Using WEP or WAP codes</td></tr>
<tr><td>FIREWALLS/ antivirus software</td><td>• To prevent hacking
• To prevent spyware / viruses
Must match</td></tr>
<tr><td>ENCRYPTION</td><td>• Of transmitted data</td></tr>
<tr><td>SCREENING POTENTIAL EMPLOYEES</td><td>• CRB/DBS checks
• Background checks</td></tr>
<tr><td>ACCESS RIGHTS/LOGON PROCEDURES / AUDIT TRAILS</td><td>• (Logon procedures) use of suitable username and hierarchy of passwords.

• (Audit trails) for tracing of access and detection of irregularities.</td></tr>
<tr><td>CALL BACK PROCEDURES FOR REMOTE ACCESS</td><td>Who/what/when/why</td></tr>
<tr><td>USE OF PROXY SERVERS</td><td>• A proxy server can act as an intermediary between the user’s computer and the Internet to prevent from attack and unexpected access.
• It allows client computers to make indirect network connections to other network services and hide our IP address.
• As soon as getting such request, the proxy server will seek for the resources from the cache in its local hard disk.
• To implement internet access control like authentication for Internet connection, bandwidth control, online time control, Internet web filter and control filter etc.
• To scan outbound content, e,g, for data leak protection.</td></tr>
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</td><td>4x2</td></tr>
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Q.	Answer	Marks
17.	**1 mark for each explanation** **Entity –** an object of the real world that is relevant to an ICT system e.g. a place, object, person, customer, product, etc **Attribute --** a single item of data which represents a fact about an entity. **Relationship** – the way in which entities/tables in a system are related / connected/ linked to each other. **(Explanations need to just convey these meanings and not be literal**)	1 1 1
18.	Example of possible tables PATIENT (Patientid, surname, phone, DOB, Wardid#, Physioid#) PHYSIOTHERAPIST (Physioid, surname, phone, etc) Underline = primary, # = foreign **1 mark per table name** **1 mark per foreign key** **1 mark per primary key** **1 mark for 2 extra fields in each table (can be the same)** If Wardid is duplicated then no mark for that key. NB No mark for a primary or foreign key which is not labelled.	7

Q.	Answer	Marks
19	**Description of any four of the following with an example/extension 4x2 First mark is for term in bold** **If the term isn't fully there do not penalise if description is right** **(Security) Hierarchy of passwords** limits users to various parts of the program.(1) A receptionist would only have access to basic customer details whilst a manager would see all information on the customer account.(1) **(Security) Access rights** to parts of the program only certain users can access and change data.(1) A clerk would see all the information on a customer account but be unable to alter the hire rate details whilst a manager could.(1) **Consistency** - Data consistency is the relationship between the input data, the processed data and the output data as well as other related data.(1) If the system is working properly the data will be correct at each stage and is said to be consistent.(1) OR Data consistency is using one file to hold a central pool of data. / A company may hold all its customer data in one file. (1) This avoids the need to input data twice so that if data is changed in one file it won't need to be changed in another and remains consistent.(1) OR Data being inconsistent in a flat file due to possibility of different formats etc.(1) and being consistent in a RDBMS as each record is only stored once so cannot have different attributes(1) **Redundancy** Data redundancy is where you store an item of data more than once / A company may hold its data in different files.(1) This is wasteful because some data may need to be input twice and if data is changed in one it will need to be changed in the other. / Data which is repeated unnecessarily is called redundant data.(1) **Independence** Data independence – the data and the applications/programs used to access it are independent/separate.(1) New applications can be developed to access the data without changing the data / New systems can still use existing data. **(1)** **Integrity** – Less chance of errors in data (1) as data only appears once in database (1)	4x2