OCR
Oxford Cambridge and RSA

GCE

ICT

Unit **G063:** Systems, Applications and Implications

Advanced GCE

Mark Scheme for June 2016

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This mark scheme is published as an aid to teachers and students, to indicate the requirements of the examination. It shows the basis on which marks were awarded by examiners. It does not indicate the details of the discussions which took place at an examiners' meeting before marking commenced.

All examiners are instructed that alternative correct answers and unexpected approaches in candidates' scripts must be given marks that fairly reflect the relevant knowledge and skills demonstrated.

Mark schemes should be read in conjunction with the published question papers and the report on the examination.

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Question			Answer	Mark	Guidance
1			Two from e.g. • **User manual** (1) to provide reference material for staff training (1) to ensure that users can use the system effectively and solve problems (1) • **Technical guide** (1) so that in the event of maintenance (1) the programmer employed will know how the system was constructed (1) • **Program/System specifications** (1) listing hardware and software required (1) with minimum requirements to run the program (1) • **Security details** (1) including passwords and access rights (1) as staff will change during the life of the system (1) • **Recovery plan** (1) that may include how to retrieve backups (1) in the event of a system failure / disaster (1) • **Test plans, data and logs** (1) so that in the event of future changes to the system (1) the test plan can be re-run to ensure that the same results are produced (1)	[6]	*One mark for the identification and two for the description of the purpose* 0 marks if no identification
2			Four from e.g. • Prototype created (1) • Given to client (1) • Changes/errors identified (1) • Changes implemented (1) • Iterative cycle/Given back to client (1) • Can be evolutionary/throwaway (1)	[4]	
3			Two from e.g. • Data (from sensor readings) will be processed immediately (1) within a specified time limit/e.g. preventing a crash (1) • The system can react fast enough (1) to influence behaviour in the outside world/ e.g. modify the planes direction/preventing a crash (1)	[4]	Read then whole answer and mark to the candidates advantage. If awarding mark for example, it must be different

<table>
<tr><th colspan="3">Question</th><th>Answer</th><th>Mark</th><th>Guidance</th></tr>
<tr><td>4</td><td></td><td></td><td>
<table>
<tr><td>4</td><td>Two complete comparisons</td></tr>
<tr><td>3</td><td>One complete comparison and one individual point</td></tr>
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<tr><td>1</td><td>One individual points about either side</td></tr>
</table>

Comparisons may include e.g.

• Coverage. Satellite phones have global coverage whereas cell phones rely upon proximity to terrestrial base station masts
• Size. Satellite phones are larger and heavier than cell phones.
• Security. Satellite phones are more secure since they bypass local telecoms systems whereas cell phones can be monitored more easily.
• Cost. Satellite phone call rates per minute are much higher than cell phones.
</td><td>[4]</td><td>If the point is the same / different for both then the candidate must explain why it is for both to gain marks for both.</td></tr>
<tr><td></td><td></td><td></td><td></td><td></td><td></td></tr>
<tr><td>5</td><td></td><td></td><td>
<table>
<tr><td>High</td><td>5-6</td><td>Candidate has explained reason(s) why a proxy server should be used within a company network</td></tr>
<tr><td>Medium</td><td>3-4</td><td>Candidate has described advantage(s) of using a proxy server for a company network</td></tr>
<tr><td>Low</td><td>1-2</td><td>Candidate has identified advantage(s) of using a proxy server</td></tr>
</table>

Answers may include e.g.

• A proxy server will cache recently viewed web pages which will allow subsequent visitors to the page within the company faster access. This leads to a reduction in external bandwidth demand and associated costs.
• Web filtering can be applied at the proxy level to prevent access to undesirable content giving centralised control to a network manager
• Security can be implemented on the proxy server with a firewall to monitor incoming and outgoing traffic. It can maintain anonymity of machine addresses behind the proxy to decrease the risks from hackers.
• Audit trails can record employee activity in case a code of conduct is broken
</td><td>[6]</td><td>Band 5-6 answers will have a clear line of reasoning that explains the impact of the point described

Band 3-4 answers will be descriptive and will be in context

Band 1-2 answers will identify points</td></tr>
</table>

Question			Answer	Mark	Guidance
6			Three from Max two per component A knowledge base e.g. • used to store the knowledge of a human expert (1) or heuristic / probabilistic rules (1) which informs the decision process of the expert system (1) An inference engine e.g. • makes decisions based upon the knowledge base (1) in combination with questions and answers given by the user (1) to narrow down range of possible answers/go down different branches of the tree (1) that leads to a diagnosis or answer (1) A user interface e.g. • allows the user to input answer (1) output results (1) output questions (1)	[6]	No marks for identification of component e.g. knowledge base No marks if the component not identified Accept a labelled diagram
7			Two from e.g. • Data will need to be entered into both the new and the old system (1) which means more staff time is taken up in administration rather than teaching (1) • Data may be entered differently into the two systems leading to inconsistency (1) which means time and resources have to be allocated to finding the errors and checking them (1) • There may be specialist equipment that each different system requires (1) so two separate systems have to be supported and operated (1)	[4]	

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<tr><td>8</td><td></td><td></td><td>
<table>
<tr><td>High</td><td>5-6</td><td>Candidate has explained a positive and a negative impact regarding the effectiveness of standards. There is a reasoned conclusion.</td></tr>
<tr><td>Medium</td><td>3-4</td><td>Candidate has described positive and/or negative point(s) regarding the effectiveness of standards.</td></tr>
<tr><td>Low</td><td>1-2</td><td>Candidate has identified positive or negative point(s).</td></tr>
</table>

Answers may include e.g.

• A number of competing standards may evolve in a fast changing environment leading to potential difficulty for consumers or companies deciding which to adopt e.g. Flash, Silverlight
• Standards are sometimes voluntary e.g. HTML, and different web browsers may implement them to a greater or lesser degree, which leads to increased development time and cost for website designers
• Standards take a long time to be agreed upon by all interested parties by which time technology has moved on
• A common core of hardware standards does allow effective communication to take place e.g. Wireless 802.11
</td><td>[6]</td><td>Band 5-6 answers will have a clear line of reasoning that explains the impact of the points described, both positive and negative

Band 3-4 answers will be descriptive and will be in context

Band 1-2 will identify points

Assume answers are in context unless clearly not.</td></tr>
<tr><td></td><td></td><td></td><td></td><td></td><td></td></tr>
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<tr><th colspan="3">Question</th><th>Answer</th><th>Mark</th><th>Guidance</th></tr>
<tr><td>9</td><td>a</td><td></td><td>
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<tr><td>4</td><td>Two complete comparisons</td></tr>
<tr><td>3</td><td>One complete comparison and one individual point</td></tr>
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</table>
Answers may include:
• A virtual network may exist across more than one physical network by connecting through a WAN whereas a LAN is physically connected in one location
• A virtual network could be a subset of the machines on a LAN whereas a LAN refers to all of the machines that are connected
• A virtual network is simulated in software whereas a LAN is physical
• Access to both a LAN and a virtual network can be secured through the use of UserIDs and passwords
</td><td>[4]</td><td>If the point is the same / different for both then the candidate must explain why it is for both to gain marks for both

Answers may relate to VLANS (subset of a LAN), VPN or virtual software based networks</td></tr>
<tr><td></td><td></td><td></td><td></td><td></td><td></td></tr>
<tr><td>9</td><td>b</td><td>i</td><td>Two from e.g.
• Fibre optic can cover large distances between buildings without signal degradation (1) which means larger distances can be spanned without repeaters (1)
• Fibre optic will have a higher bandwidth (1) which means that high bandwidth demand services such as video streaming can run effectively (1)
• Fibre optic is less susceptible to interference (1) which means the connection will be more reliable and require less data packets to be resent (1)
• Fibre optic transmissions are more secure from eavesdropping (1) which reduces the chance of a security breach (1)</td><td>[4]</td><td></td></tr>
<tr><td></td><td></td><td></td><td></td><td></td><td></td></tr>
<tr><td>9</td><td>b</td><td>ii</td><td>Two from e.g.
• There is no need for cables (1) which means that devices can connect from any position within the building (1)
• Mobile 3G devices e.g. smart phones (1) can be connected without incurring data costs (1)
• Wireless standards e.g. 802.11 exist (1) which enable a wide variety of devices to be connected to the network (1)</td><td>[4]</td><td></td></tr>
</table>

Question			Answer	Mark	Guidance
9	c		Two from e.g. • Leased lines can be configured to have a higher upload speed than download speed (1) which is important when running a webserver that must respond within a reasonable time to customers / where upload demand will be higher than download demand (1) • There is no contention ratio because a direct connection will be created between the business and the ISP (1) which means that the bandwidth is guaranteed (1)	[4]	
10	a	i	One from e.g. • The design specification will show how the requirements within the requirement specification are to be met (1) • What the form will look like (1) • Look and feel of the application (1)	[1]	
	a	ii	Three from e.g. • Data structures • Validation routines • Test plan • Error messages • Input screen appearance and layout • House style definition • Modelling diagrams • Queries • Formula	[3]	

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<tr><td>10</td><td>b</td><td></td><td>
<table>
<tr><td>High</td><td>5-6</td><td>Candidate has explained a positive and a negative point regarding the use of forms dialogue that apply to smart phone and tablet HCIs. There is a reasoned conclusion.</td></tr>
<tr><td>Medium</td><td>3-4</td><td>Candidate has described positive and/or negative point(s) regarding the use of forms based dialogue.</td></tr>
<tr><td>Low</td><td>1-2</td><td>Candidate has identified positive or negative point(s).</td></tr>
</table>
Answers may include :
• Options can be selected from form controls which can speed up data input e.g. drop-down lists of options
• Form controls can help to validate data input and error messages can be displayed within the dialogue
• Form controls can be difficult to use on a small touch screen because users may struggle to point accurately at the controls
• Forms dialogue can contain a lot of data that must be typed which means that it is not ideally suited to smart phones and tablets without keyboards
• Forms can include instructions to the user
</td><td>[6]</td><td>Band 5-6 answers will have a clear line of reasoning that explains the impact of the points described, both positive and negative

Band 3-4 answers will be descriptive and will be in context

Band 1-2 will identify points</td></tr>
<tr><td></td><td></td><td></td><td></td><td></td><td></td></tr>
<tr><td>10</td><td>c</td><td></td><td>Four from:
e.g.
A user needs to be able to predict the likely behaviour of operations within the application (1) the interface must reflect the way in which the majority of users will expect it to function (1)
to ensure that functions are completed successfully (1) and this relies upon the user's prior experience being taken into account during design (1) otherwise the user will experience difficulty learning and operating the application (1)</td><td>[4]</td><td>Mark could be 1 point identification with 3 point expansion or 2 identifications with associated expansions</td></tr>
<tr><td></td><td></td><td></td><td></td><td></td><td></td></tr>
<tr><td>10</td><td>d</td><td></td><td>Four from:
e.g.
A tester can develop a test plan (1) using a range of test data including normal, extreme and invalid (1)
Run the tests in the test plan/use the test plan (1) and record the results of each test (pass / fail) in a test log (1) so that failed tests can be identified (1) and feedback test results to programmers(1)</td><td>[4]</td><td>Mark could be 1 point identification with 3 point expansion or 2 identifications with associated expansions</td></tr>
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<tr><td>11</td><td>a</td><td></td><td>
<table>
<tr><td>High</td><td>5-6</td><td>Candidate has explained a positive and a negative impact of using a central database with remote local indexes. There is a reasoned conclusion.</td></tr>
<tr><td>Medium</td><td>3-4</td><td>Candidate has described positive and/or negative point(s) of using a central database with remote local indexes.</td></tr>
<tr><td>Low</td><td>1-2</td><td>Candidate has identified positive or negative point(s)</td></tr>
</table>
Answers may include:
• Speed of processing will vary. Where searches can be completed in a local office on a local index the speed will be fast. Some searches may have to be performed centrally at headquarters and this will be slower.
• Security is high because central access controls can be imposed on data access. Only the local index is stored at each separate office.
• Integrity and consistency of data will be high because one central database is stored. Backups can also be controlled centrally.
• Storage demands at the central location will be high. Multi-user access will be required and processing demands will be high.
• Availability is reliant upon communications links to the central store and the central store working.
</td><td>[6]</td><td>Band 5-6 answers will have a clear line of reasoning that explains the impact of the points described, both positive and negative

Band 3-4 answers will be descriptive and will be in context

Band 1-2 will identify points</td></tr>
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<tr><td>11</td><td>b</td><td></td><td>Two from e.g.
• Physical access to the data (1) can be protected by having physical locks on server room doors (1) or having security patrols (1) or password authenticated accounts (1)
• Interception of data (1) means that data transmissions between sites should be encrypted (1)
• Loss of data integrity (1) take action to reduce update latency (1)
• Data can be deleted by a virus (1) install/update antivirus software</td><td>[4]</td><td>Only award solution if issue identified.</td></tr>
</table>

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<tr><td>12</td><td>a</td><td></td><td>Two from e.g.
• A virtual representation of the house (exterior or interior) can be generated (1) to show customers what the house might look like so that they can comment on it (1)
• A model can allow all components and their measurements to be entered (1) and scale plans could be printed automatically from different elevations (1)
• Components within the model can be changed e.g. insulation density (1) to see the overall effect that this will have e.g. energy efficiency rating (1)</td><td>[4]</td><td>Answers must relate to potential uses in context and not to general advantages</td></tr>
<tr><td></td><td></td><td></td><td></td><td></td><td></td></tr>
<tr><td>12</td><td>b</td><td></td><td>Two from e.g.
• The package may not exactly fit the company’s requirements (1) so the purpose may never be met precisely / and the company’s working practices may have to change to meet the software’s way of doing things (1)
• The footprint of the system may be larger (1) requiring more storage or processing resources (1)
• Support will be generic for the package rather than for the models the company produces (1) so there will be no specialist support (1)</td><td>[4]</td><td></td></tr>
<tr><td></td><td></td><td></td><td></td><td></td><td></td></tr>
<tr><td>12</td><td>c</td><td></td><td>
<table>
<tr><td>High</td><td>5-6</td><td>The candidate has explained why consultation is important</td></tr>
<tr><td>Medium</td><td>3-4</td><td>The candidate has described why consultation is important</td></tr>
<tr><td>Low</td><td>1-2</td><td>The candidate has identified point(s) regarding the importance of consultation</td></tr>
</table>
Answers may include:

Consultation
• If a wide range of employees are consulted a wide range of information can be gathered that can be used to develop a more effective plan
• Individuals that have been consulted will feel greater commitment and involvement in the project which will increase the overall chance of success
• Change is emotive and consultation allows employees to have their fears addressed
• Consultation will ensure that employees are kept up to date regarding proposed changes so that there are no surprises
• Consultation allows a clear rationale for change to be explained to employees who will then understand the potential benefits</td><td>[6]</td><td></td></tr>
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<tr><td>13</td><td></td><td></td><td>
<table>
<tr><th>Band</th><th>Mark</th><th>Criteria</th></tr>
<tr><td>3</td><td>8-11</td><td>The candidate has explained the impacts.

At the bottom of the band, will explain a single impact</td></tr>
<tr><td>2</td><td>4-7</td><td>The candidate has described the impacts

At the bottom of the band, will describe a single impact</td></tr>
<tr><td>1</td><td>1-3</td><td>The candidate is able to identify the impacts

At the bottom of the band, will identify a single impact</td></tr>
</table>

Points may include:

• Technical support availability (increased demand)
• Staff training and associated costs
• Staff opinion / concern dealing with change and the management of it
• Compatibility of current hardware or potential obsolescence and standards issues
• Timing logistics to avoid impacting on the normal working practice of the company
• Data migration such as user accounts and settings from the old to the new system
</td><td>[11]</td><td>Impacts may be positive or negative</td></tr>
<tr><td></td><td></td><td></td><td></td><td></td><td></td></tr>
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<table>
<tr><th>Band</th><th>Mark</th><th>Criteria</th></tr>
<tr><td>3</td><td>8-11</td><td>The candidate has explained a number of relevant impacts.
Subject specific terminology will be used accurately and appropriately.

At the bottom of the band, may have explained a single point</td></tr>
<tr><td>2</td><td>4-7</td><td>The candidate has described a number of relevant impacts.
Subject specific knowledge will be evident and some subject specific terminology will be used.

At the bottom of the band, may have described a single point</td></tr>
<tr><td>1</td><td>1-3</td><td>The candidate has identified a number of relevant impacts.
Subject specific terminology may be limited or missing.

At the bottom of the band, may be a single identification</td></tr>
</table>

Points for discussion may include:

• Access to personal data can be safeguarded by improvements in biometric security devices for personal authentication
• Advances in big data and data mining allow an extensive picture of an individual’s patterns and habits to be formed
• Developments in quantum computing could render traditional encryption algorithms obsolete and thus overcome personal encryption measures that have been implemented
• Miniaturised spy drone hardware can be used for surveillance
• Developments in algorithms and AI techniques can improve facial recognition and monitoring
• Advances in AI could lead to the AI singularity
</td><td>[11]</td><td>Note: the candidates answer must relate to the identification that they have made.

The mark will be capped at 3 in the first band if no identification has been made.</td></tr>
<tr><td></td><td></td><td></td><td></td><td></td><td></td></tr>
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