

**GCE**

**Applied ICT**

Unit **G055**: Networking Solutions

Advanced GCE

**Mark Scheme for June 2017**

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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.

OCR will not enter into any discussion or correspondence in connection with this mark scheme.

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## Annotations

Annotation	Meaning
^	Something vital to the mark point has been omitted.
BOD	Benefit of the doubt given.
NBOD	Benefit of the doubt <b>not</b> given.
CON	Candidate contradicts him/herself.
NAQ	Candidate has not answered the question as set.
MTP	Candidate has missed the point of the question.
W	Candidate is working towards a mark but has not given enough to receive credit at this point.
NE	Not enough for the candidate to receive credit.
TV	Answer is too vague to receive credit.
FTC	Follow-through credit. When an earlier wrong answer has been penalised, this may be used to show that credit can now be given to a part of the script which depends on that earlier wrong answer. This avoids penalising a candidate twice for the same error, but <b>should only be used where specified by the PE</b> (for this paper – question 6b only).
MAX	Shows that the maximum number of marks for a part-question or question has been awarded (even though the answer may contain further correct points).
R	The point repeats one already awarded credit.
JE	Candidate has <i>just</i> given enough to be awarded a mark.

## Subject-specific marking instructions

There are 100 marks available for this assessment. They are allocated as follows:

- Tasks 2 and 3                    30
- Section A of the test paper   50
- Section B of the test paper   20

## TASKS

Task	Answer / Indicative Content	Mark	Guidance									
2	One mark for each component added to/replaced in the network diagram (up to 7 marks): <ul style="list-style-type: none"> <li>• Web server added</li> <li>• Web server wired to network (switch or router but not wireless)</li> <li>• Firewall added</li> <li>• Firewall placed between router and internet</li> <li>• Router changed to DSL/SDSL (but not wireless)</li> <li>• Wireless access point added (allow wireless router only if in addition to wired router)</li> <li>• Wireless access point wired to switch</li> </ul> Plus up to 2 marks each for: <ul style="list-style-type: none"> <li>• an appropriate addition (e.g. a laptop added)</li> </ul>	9	Max 2 marks for items not in first bulleted list.									
	Up to <b>three</b> marks each for any <b>four</b> reasons, e.g.: <table border="1"> <tbody> <tr> <td>Web server</td> <td>Needed to provide storage/protocols (1) for hosting (1) of websites for external access/of intranet (1)</td> </tr> <tr> <td>Firewall</td> <td>Needed to protect servers (1) from external attacks (1) such as hacking attempts(1)</td> </tr> <tr> <td>S/DSL router</td> <td>Needed to provide high speed communication in both directions (1) for efficient hosting (1) of external websites (1)</td> </tr> <tr> <td>Wireless access point</td> <td>Needed to provide wireless connections (1) for laptops/workstations (1) to connect to the network (1)</td> </tr> <tr> <td>Laptop</td> <td>Needed for employees to work both in and out of the office (1) and to have full connectivity to network (1) through the wireless access point (1)</td> </tr> </tbody> </table>			Web server	Needed to provide storage/protocols (1) for hosting (1) of websites for external access/of intranet (1)	Firewall	Needed to protect servers (1) from external attacks (1) such as hacking attempts(1)	S/DSL router	Needed to provide high speed communication in both directions (1) for efficient hosting (1) of external websites (1)	Wireless access point	Needed to provide wireless connections (1) for laptops/workstations (1) to connect to the network (1)	Laptop
Web server	Needed to provide storage/protocols (1) for hosting (1) of websites for external access/of intranet (1)											
Firewall	Needed to protect servers (1) from external attacks (1) such as hacking attempts(1)											
S/DSL router	Needed to provide high speed communication in both directions (1) for efficient hosting (1) of external websites (1)											
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Laptop	Needed for employees to work both in and out of the office (1) and to have full connectivity to network (1) through the wireless access point (1)											

Task	Answer	Guidance	
3	<p>Answers may include:</p> <p>Hardware:</p> <ul style="list-style-type: none"> <li>• Computer with internet access</li> <li>• Router/modem</li> <li>• Broadband</li> </ul> <p>Software</p> <ul style="list-style-type: none"> <li>• Browser</li> <li>• Web editing software /CMS system</li> <li>• FTP software</li> <li>• Connection software</li> <li>• Protocol software</li> </ul> <p>Reasons – customers will need:</p> <ul style="list-style-type: none"> <li>• full access to the internet.</li> <li>• A router/modem to provide access to the broadband connection.</li> <li>• a computer connected to the router for internet access</li> <li>• browser software to preview changes to their websites as they are editing OR to access the site for editing</li> <li>• web editing software to change the content of their websites (this might be a content management system or web editing software</li> <li>• FTP software for uploading content to the hosting service if uploading outside a CMS</li> <li>• Connection software for establishing and maintaining the internet connection</li> <li>• Protocols for ensuring that communication can take place (e.g. IP, TCP,DNS)</li> </ul>	Marks	Levels of response
		H (7-9)	<p>The candidate will have written a clear and relevant guide in which he/she has identified a range of hardware and software components and will have given a clear and relevant reason for each component, or group of components. Answers will be technical and wholly relevant to the case study.</p> <p>Information will be presented in a structured and coherent form. There will be few, if any, errors in spelling, grammar and punctuation. Technical terms will be used appropriately and correctly.</p>
		M (4-6)	<p>The candidate will have written a relevant guide in which he/she will have identified a range of hardware and/or software components and will have given a relevant reason for some of these components or groups of components. The guide may be one-sided, focusing on one type of component (hardware or software). Answers will have some relevance to the case study and some technical terms will be used.</p> <p>Information will be presented in a structured format. There may be occasional errors in spelling, grammar and punctuation. Technical terms will be mainly correct.</p>
		L (1-3)	<p>The candidate will have identified some relevant components with limited reasons. Some use of technical language will be evident in the naming of the components. Answers may have little or no relevance to the case study.</p> <p>Information will be poorly expressed and there will be a limited, if any, use of technical terms. Errors in grammar, punctuation and spelling may be intrusive.</p>
0	Answer not worthy of credit		

## Question Paper – Section A

Question		Answer / Indicative Content	Mark	Guidance
1	a	<p>Up to 3 marks for each of <b>two</b> benefits explained e.g.:</p> <ul style="list-style-type: none"> <li>• Sharing of hardware resources (1) such as printers/internet connection (1) reduces cost to charity (1)</li> <li>• Sharing of common data (1) e.g. database of clients or support services (1) helps to ensure that volunteers have the most up to date information (1)</li> <li>• Access to email (1) improves communication /easier communication from outside office (1) helps to ensure volunteers are as fully informed as possible (1)</li> </ul>	6	
	b	<p>Up to 3 marks for each of two disadvantages explained, e.g.:</p> <ul style="list-style-type: none"> <li>• Potential loss of security (1) hackers can access whole network (1) rather than one computer (1)</li> <li>• Costs(1) installation and maintenance have a cost (1) and this might be high for a charity (1)</li> <li>• Extra supervision costs (1) someone will need to look after the server (1) difficult job for a volunteer (1)</li> </ul>	6	

Question		Answer / Indicative Content	Mark	Guidance
2	a	<p>Up to 2 marks for a correct definition e.g.</p> <ul style="list-style-type: none"> <li>• computers within a building (1) communicates using radio frequencies/other wireless technology (1)</li> </ul>	2	
	b	<p>Up to 2 marks for an advantage explained e.g.:</p> <ul style="list-style-type: none"> <li>• No wiring to install (1) so no need to make changes to building(1)</li> <li>• Low cost for charity (1) no cabling/lower installation costs (1)</li> <li>• Mobility (1) can add/remove volunteers' devices to/from network easily (1)</li> </ul>	2	

Question	Answer / Indicative Content	Mark	Guidance
3	Ethernet -1 mark  Plus up to two marks for one of e.g.: <ul style="list-style-type: none"><li>• UTP cable and RJ45 connectors (1) are affordable (1)</li><li>• Network speeds of up to 1Gb/s (1) are appropriate for what a charity might need</li></ul>	3	

Question	Answer	Guidance	
4	<p>Answers may include:</p> <ul style="list-style-type: none"> <li>• Divide into separate physical sections for security</li> <li>• Keep web server and file server on different parts of the network</li> <li>• Keep internal and external traffic separate</li> <li>• Maintain efficiency of network</li> <li>• Can control access to separate sections</li> <li>• Can keep web server at the top of a branch so intranet and hosting</li> <li>• Intranet and hosting accessed from different routes</li> <li>• More devices are needed so cost is higher</li> <li>• May be more complex to set up</li> </ul>	Marks	Levels of response
		H (5-6)	<p>The candidate will have given a clear evaluation, with positive and negative points, of the use of the tree topology and will make a recommendation for adoption or not. The candidate will have used technical terms in his/her evaluation and will have covered both access control and traffic management. The evaluation will be wholly relevant to the case study.</p> <p>Information will be presented in a structured and coherent form. There will be few, if any, errors in spelling, grammar and punctuation. Technical terms will be used appropriately and correctly.</p>
		M (3-4)	<p>The candidate will have made an attempt to evaluate the use of the tree topology and will have made some positive or negative points, although the evaluation may be one-sided. The candidate will have used some technical terms in his/her evaluation and will have covered access control and/or traffic management. The evaluation will be mostly relevant to the case study.</p> <p>Information will be presented in a structured format. There may be occasional errors in spelling, grammar and punctuation. Technical terms will be mainly correct.</p>
		L (1-2)	<p>The candidate will have listed a number of relevant points, either positive or negative. Points may be descriptive rather than evaluative and the answer may lack reasoning. Technical terms may or may not have been used and there may be no attempt at a recommendation. There may be little or no relevance to the case study.</p> <p>Information will be poorly expressed and there will be a limited, if any, use of technical terms. Errors in grammar, punctuation and spelling may be intrusive.</p>
0	Answer not worthy of credit		



Question	Answer / Indicative Content	Mark	Guidance
<b>5</b>	<p>Up to 2 marks for a correct definition e.g.:</p> <ul style="list-style-type: none"> <li>• Uses a wide range of frequencies (1) to provide a fast data stream (1)</li> <li>• A wide bandwidth (1) that allows a number of different customers to use the connection simultaneously (1)</li> </ul>	<b>2</b>	
	<p>Up to 3 marks for each of two stages explained e.g.:</p> <ul style="list-style-type: none"> <li>• Set up router (1) configure router with IP address and other settings e.g. passwords (1) individual to the charity (1)</li> <li>• Document settings (1) record IP address, passwords, etc (1) so that these can be reinstated by an engineer if needed (1)</li> <li>• Create an installation report (1) with details of provider contact/how configured/dates (1) for later maintenance by OCRS (1)</li> </ul>	<b>6</b>	
	<p>1 mark for a relevant advantage of broadband over dial-up e.g. faster/always on (1)</p> <p>1 mark for a relevant disadvantage of broadband e.g. more expensive/wasted bandwidth (1)</p> <p>Plus up to 2 marks for a recommendation e.g:</p> <ul style="list-style-type: none"> <li>• Future expansion (1) no need to change as charity grows (1)</li> <li>• Regular outgoings (1) helps with charity's budgeting (1)</li> <li>• Faster when needed (1) don't need to connect /disconnect each time it is used (1)</li> <li>• More reliable when needed (1) dial up can sometimes drop connection (1)</li> </ul>	<b>4</b>	

Question		Answer / Indicative Content	Mark	Guidance
6	a	Up to 2 marks for a description e.g.: <ul style="list-style-type: none"> <li>• Sits between two networks (1) OCRS and internet (1)</li> <li>• Controls flow of data (1) between the two networks (1)</li> </ul>	2	FTC award marks for a correct description of a genuine protocol not credited.
	b	Up to 3 marks for an explanation e.g.: <ul style="list-style-type: none"> <li>• Access control (1) will filter addresses /protocols allowed (1) to protect network (1)</li> <li>• Conversion between internet protocols (1) and protocols of OCRS network (1) for connection between the two (1)</li> </ul>	3	
	c	One mark for a protocol, e.g.: <ul style="list-style-type: none"> <li>• HTTP/HTTPS/FTP</li> </ul> Up to two marks for a description e.g. <ul style="list-style-type: none"> <li>• HTTP/S used for web traffic/secure transfer (1) to and from web browsers (1)</li> <li>• FTP used for file transfers (1) between web server and charity networks (1)</li> </ul>	3	

Question		Answer / Indicative Content	Mark	Guidance
7	a	One mark each for 2 identified contents e.g. <ul style="list-style-type: none"> <li>• Device addresses</li> <li>• Size of data transferred</li> <li>• Date and time</li> <li>• Protocols used</li> </ul>	2	
	b	Up to 3 marks for one explanation of use e.g.: <ul style="list-style-type: none"> <li>• Spot recurring patterns (1) to help identify problem areas (1) and maintenance needs (1)</li> <li>• Identify high traffic paths (1) by inspecting contents of log (1) so that upgrade needs can be identified (1)</li> </ul>	3	

## Question Paper – Section B

Question		Answer / Indicative Content	Mark	Guidance
8	i	Up to 2 marks for a correct description, e.g.: <ul style="list-style-type: none"> <li>• Holds copies of applications (1) for distribution over a network (1)</li> <li>• Delivers applications (1) to client workstations (1)</li> </ul>	2	
	ii	Up to 2 marks for a correct description of a file server, e.g.: <ul style="list-style-type: none"> <li>• Stores and manages files (1) for users on a network (1)</li> <li>• Sends to copies of files to client workstations (1) on request (1)</li> </ul>	2	

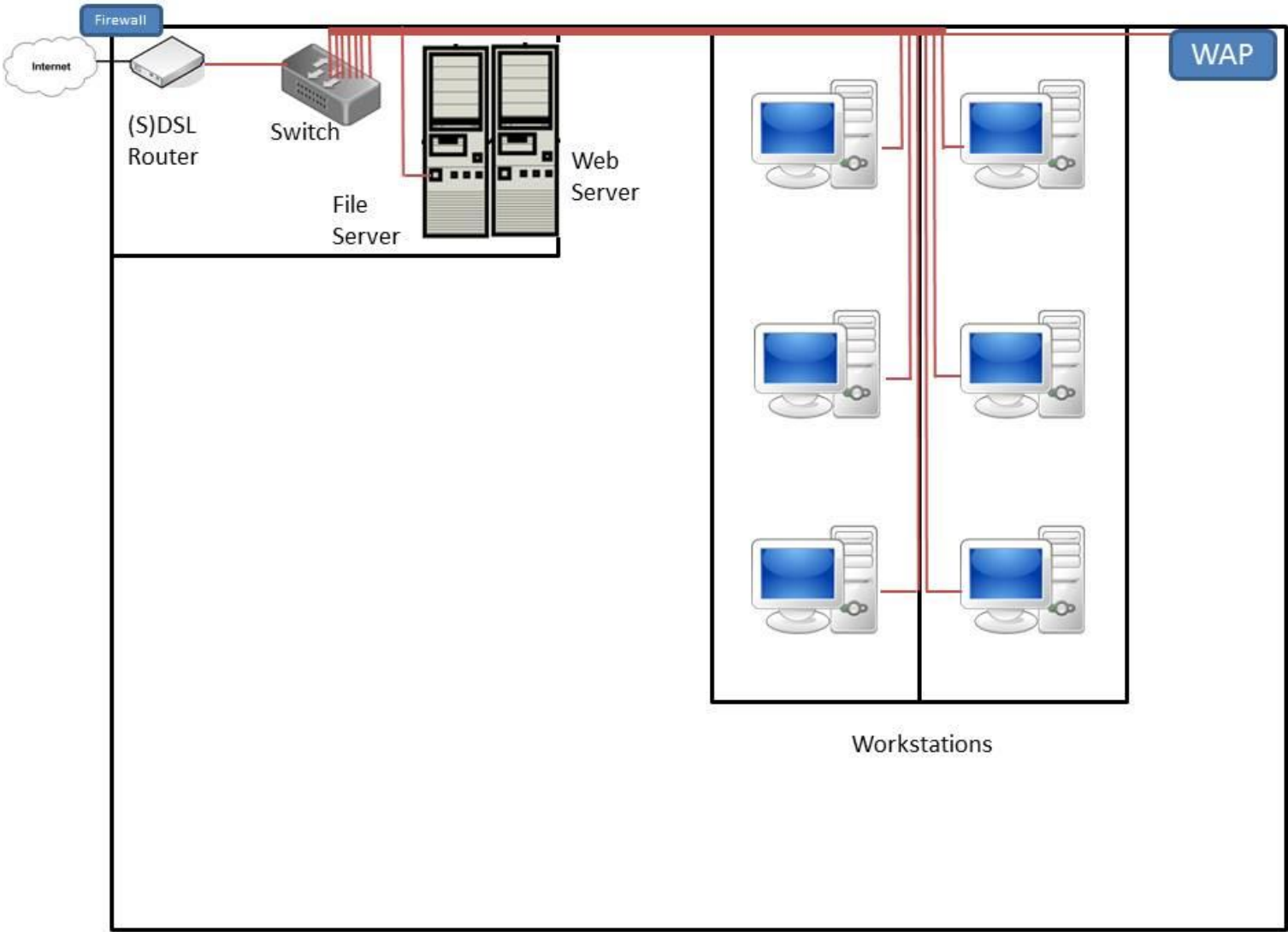
Question		Answer / Indicative Content	Mark	Guidance
9		One mark each for up to 2 components identified e.g.: <ul style="list-style-type: none"> <li>• Destination address</li> <li>• Source address</li> <li>• Protocol used</li> <li>• Data</li> <li>• Error checking data</li> </ul>	2	

Question		Answer / Indicative Content	Mark	Guidance
10		Up to 2 marks for a correct comparison e.g.: <ul style="list-style-type: none"> <li>• Digital has 2 states (1) analogue has variable number of states (1)</li> <li>• Digital can be directly encoded (1) analogue needs conversion (1)</li> </ul>	2	

Question		Answer / Indicative Content	Mark	Guidance
11		Up to 3 marks for an explained use e.g.: <ul style="list-style-type: none"> <li>• Employees can access data on local network from home (1) as they would from the office (1) to allow extension of the working day (1)</li> <li>• Access to network for mobile working (1) for uploading data and documents (1) as if working locally (1)</li> </ul>	3	

Question	Answer	Guidance	
12	Answers may include: <ul style="list-style-type: none"> <li>• Increased susceptibility to hacking</li> <li>• Need to balance ease of access for authorised users with need to protect data</li> <li>• Need to keep track of authorised users</li> <li>• Extranet needs to be separated from the rest of the company network</li> <li>• Firewall will need to be carefully configured to restrict access</li> <li>• A VPN or a dedicated connection will allow required level of security</li> </ul>	Marks	Levels of response
		H (7-9)	<p>The candidate will have clearly discussed a variety of security problems. The candidate will have made use of technical terms in his/her discussion and will have included a range of security problems and how each might be minimised. The discussion will be wholly relevant to the security of a system hosting an intranet.</p> <p>Information will be presented in a structured and coherent form. There will be few, if any, errors in spelling, grammar and punctuation. Technical terms will be used appropriately and correctly.</p>
		M (4-6)	<p>The candidate will have clearly discussed a range of security problems. The candidate will have made use of technical terms in his/her discussion and may have explained a range of security problems and/or how problems might be minimised. The discussion will be mostly relevant to the security of a system hosting an intranet.</p> <p>Information will be presented in a structured format. There may be occasional errors in spelling, grammar and punctuation. Technical terms will be mainly correct.</p>
		L (1-3)	<p>The candidate will have identified a limited range of security problems and/or security measures and these might be described generally rather than in connection with an extranet. The candidate will have made minimal use of technical terms in his/her discussion.</p> <p>Information will be poorly expressed and there will be a limited, if any, use of technical terms. Errors in grammar, punctuation and spelling may be intrusive.</p>
0	Answer not worthy of credit		

APPENDIX 1 – Physical network layout diagram example



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