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**INFORMATION TECHNOLOGY**

**9626/12**

Paper 1 Theory

**October/November 2019**

MARK SCHEME

Maximum Mark: 90

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**Published**

This mark scheme is published as an aid to teachers and candidates, to indicate the requirements of the examination. It shows the basis on which Examiners were instructed to award marks. It does not indicate the details of the discussions that took place at an Examiners' meeting before marking began, which would have considered the acceptability of alternative answers.

Mark schemes should be read in conjunction with the question paper and the Principal Examiner Report for Teachers.

Cambridge International will not enter into discussions about these mark schemes.

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This document consists of **10** printed pages.

**Generic Marking Principles**

These general marking principles must be applied by all examiners when marking candidate answers. They should be applied alongside the specific content of the mark scheme or generic level descriptors for a question. Each question paper and mark scheme will also comply with these marking principles.

**GENERIC MARKING PRINCIPLE 1:**

Marks must be awarded in line with:

- the specific content of the mark scheme or the generic level descriptors for the question
- the specific skills defined in the mark scheme or in the generic level descriptors for the question
- the standard of response required by a candidate as exemplified by the standardisation scripts.

**GENERIC MARKING PRINCIPLE 2:**

Marks awarded are always **whole marks** (not half marks, or other fractions).

**GENERIC MARKING PRINCIPLE 3:**

Marks must be awarded **positively**:

- marks are awarded for correct/valid answers, as defined in the mark scheme. However, credit is given for valid answers which go beyond the scope of the syllabus and mark scheme, referring to your Team Leader as appropriate
- marks are awarded when candidates clearly demonstrate what they know and can do
- marks are not deducted for errors
- marks are not deducted for omissions
- answers should only be judged on the quality of spelling, punctuation and grammar when these features are specifically assessed by the question as indicated by the mark scheme. The meaning, however, should be unambiguous.

**GENERIC MARKING PRINCIPLE 4:**

Rules must be applied consistently e.g. in situations where candidates have not followed instructions or in the application of generic level descriptors.

**GENERIC MARKING PRINCIPLE 5:**

Marks should be awarded using the full range of marks defined in the mark scheme for the question (however; the use of the full mark range may be limited according to the quality of the candidate responses seen).

**GENERIC MARKING PRINCIPLE 6:**

Marks awarded are based solely on the requirements as defined in the mark scheme. Marks should not be awarded with grade thresholds or grade descriptors in mind.

Question	Answer	Marks
1	It may involve having to purchase more data loggers	
	Several people would have to be employed to carry out interviews	
	It always takes longer to gather data from an indirect data source	
	It is impossible to ensure that data was collected from a representative sample	✓
	The data may be out of date	✓
	The sample size is always smaller than if you used a direct data source	
	The purpose for which data was collected originally may be quite different from the purpose of the current research	✓
	There may be no data available. The data required has simply never been recorded	✓
	The coding used in the data is never explained	
	Compared to direct data sources, using indirect data sources is always very expensive when preparing and carrying out the gathering of data	
		<b>4</b>

Question	Answer	Marks
2	A motherboard has a collection of chips and controllers known as the chipset	✓
	A hard disk drive usually has less storage capacity than the RAM within a computer	
	ROM is the memory used to store documents the user is currently working on	
	The hard disk drive is used to store application software	✓
	A solid state drive has no moving parts	✓
	RAM is memory that cannot be changed	
	A hard disk drive uses flash memory to store data	
	RAM stores the start up instructions of a computer even when it is switched off	
	A PC can still work without having a CPU	
	The arithmetic logic unit and the control unit are part of the CPU in a computer	✓
		<b>4</b>

Question	Answer	Marks
3(a)	<p><b>Three</b> from:</p> <p>Costs more to pay programmers to write code specifically for the task/users' needs/don't share development costs with other users            Testing is limited to what the programmers think may be required ...            ... based on how they think the software will be used            Support is limited to the team of programmers only            Can take a long time to develop the software            There may be a lot of bugs as it has not been tested <u>so thoroughly</u>/has not been used before</p>	<b>3</b>
3(b)	<p><b>Three</b> from:</p> <p>It is designed specifically for the task/customers' requirements            There will be no unnecessary features            It does not have to be adapted for use            Programmers are available to make any changes required/rectify bugs            Programmers will ensure that it is compatible with the existing system and software</p>	<b>3</b>

Question	Answer	Marks
4	<p><b>Four</b> from:</p> <p>Questions are asked by system            Data/symptoms would be entered by the doctor            Questions based on these would be asked by the expert system            Doctor enters answers to these questions            The system would reason ...            ... using IF-THEN rules            System produce probabilities of diagnoses/possible diagnoses            The doctor chooses the most appropriate diagnosis</p>	<b>4</b>

Question	Answer	Marks
5(a)	<p><b>VLOOKUP(F3,\$C\$6:\$D\$17,2,0)</b></p> <p>VLOOKUP() – 1 mark            (F3 – 1 mark            ,C\$6:\$D\$17 – 1 mark            ,2 – 1 mark            ,0) – 1 mark            \$ before the column letter is optional</p>	<b>5</b>

Question	Answer	Marks
5(b)	<p><b>One mark for each step</b></p> <p>In cell K3 insert a new formula Enter J3/I3 Highlight K3 and replicate down to K20 Highlight F3:K20 Click on data then click on sort Click on sort by column K Select descending order</p>	<b>6</b>

Question	Answer	Marks
6	<p><b>Eight from:</b></p> <p>A private computer network used within one organisation Can only be accessed by workers within the organisation/ restricted access network Users tend to need user ids and passwords to prevent outsiders using the intranet Based on internet technologies/TCP/IP protocols There is a client-server relationship set up between computers and the servers Used to share information/send emails within the organisation Tends to be a LAN Has greater security/less susceptible to hackers/viruses than the internet Intranets have web pages about company events, health and safety policies and staff newsletters Contains forms for workers to complete such as claiming expenses/requesting holidays Extranet is a means of extending an organisation's intranet for use by <u>selected</u> people (outside the organisation)/so that employees can work remotely If staff working outside the organisation can access an intranet by using a VPN this becomes an extranet Extranet is set up by providing a secure link/firewall to the intranet using the internet</p> <p>Examples (max 2 marks) of extranet use could be: A company could provide access to a supplier for online ordering, order tracking and inventory management A hospital providing local doctors with access to a booking system so they can make appointments for their patients Pupils could use the school's intranet to submit work from home Employees could use the company intranet when working from home</p> <p>Maximum of 7 marks with no examples</p>	<b>8</b>

Question	Answer	Marks
7(a)	Application and system (software), compiler is system	1
7(b)	<p><b>Four</b> from:</p> <p>A compiler is a computer program/set of programs            It translates source code/program written in a high level programming language            It translates source code/program into a lower level language/assembly language/machine code/object code            It creates an executable program            It translates it for the <u>computer which can only understand machine code</u> to run            It produces error messages/list of errors to help programmer debug the program</p>	4

Question	Answer	Marks																														
8(a)	<table border="1"> <thead> <tr> <th>Attribute</th> <th>Data type</th> <th>Field size</th> <th>Format</th> <th>Type of key</th> </tr> </thead> <tbody> <tr> <td>Invoice_number</td> <td>Alphanumeric</td> <td>5</td> <td>99999</td> <td>Primary</td> </tr> <tr> <td>Number_of_items</td> <td>Numeric/integer</td> <td>–</td> <td>9</td> <td>–</td> </tr> <tr> <td>Item_cost</td> <td>Numeric/Currency</td> <td>–</td> <td>999.99</td> <td>–</td> </tr> <tr> <td>Customer_ref</td> <td>Alphanumeric</td> <td>6</td> <td>X9999X</td> <td>Foreign</td> </tr> <tr> <td>Delivered</td> <td>Boolean</td> <td>–</td> <td>–1/0</td> <td>–</td> </tr> </tbody> </table> <p>1 mark for all attributes correctly copied            1 mark for 4/5 data types correct            1 mark for Customer_ref field size correct            1 mark for 4/5 formats correct            1 mark for correct foreign key            1 mark for correct primary key</p>	Attribute	Data type	Field size	Format	Type of key	Invoice_number	Alphanumeric	5	99999	Primary	Number_of_items	Numeric/integer	–	9	–	Item_cost	Numeric/Currency	–	999.99	–	Customer_ref	Alphanumeric	6	X9999X	Foreign	Delivered	Boolean	–	–1/0	–	6
Attribute	Data type	Field size	Format	Type of key																												
Invoice_number	Alphanumeric	5	99999	Primary																												
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Customer_ref	Alphanumeric	6	X9999X	Foreign																												
Delivered	Boolean	–	–1/0	–																												
8(b)	<p><b>Six</b> from:</p> <p>Go to create view and select query design            Load the Invoices table into the window            In the query design next to 'Field'/in the field row            Type in [Number_of_items]            Then next to it type in *[Item_cost]            Replace Expr1 with total_cost            Save the query            Run the query</p>	6																														
8(c)(i)	<p>A length check could have been used            6 characters is more than 5, which is the length allowed</p>	2																														

Question	Answer	Marks
8(c)(ii)	A range check could have been used 12 500 is outside the range 1250–3400 and only numbers in this range are allowed	<b>2</b>
8(c)(iii)	A format/picture check could have been used L21789 has 1 letter followed by 5 digits when it should be 1 letter followed by 4 digits followed by 1 letter	<b>2</b>
8(c)(iv)	A check digit check could have been used The final digit produced would have been different because of <u>8 and 9 being transposed</u> /only numbers with a correct final check digit would be allowed	<b>2</b>

Question	Answer	Marks
9	<p>To be marked as a level of response:</p> <p><b>Level 3 (7–8 marks)</b></p> <p>Candidates will describe the advantages and disadvantages of HTTPS The issues raised will be justified. The information will be relevant, clear, organised and presented in a structured and coherent format. There will be a reasoned conclusion Specialist terms will be used accurately and appropriately</p> <p><b>Level 2 (4–6 marks)</b></p> <p>Candidates will describe the advantages and disadvantages of HTTPS although development of some of the points will be limited For the most part the information will be relevant and presented in a structured and coherent format. Specialist terms will be used appropriately and for the most part correctly.</p> <p><b>Level 1 (1–3 marks)</b></p> <p>Candidates may only address one side of the argument, and give basic advantages/disadvantages Answers may be simplistic with little or no relevance. There will be little or no use of specialist terms.</p> <p><b>Level 0 (0 marks)</b></p> <p>Response with no valid content.</p> <p>Candidates may refer to e.g.</p> <p>Disadvantages HTTPS uses a lot of server resources ... ... requires processing power and memory for encryption HTTPS introduces latencies/delays SSL connections take longer to set up with more roundtrips Browser caching does not work properly Modern sites will run slowly without browser caching Need to buy an SSL certificate issued by certificate authorities It is possible to make your own certificate but other users will not trust it so you need to buy one Warnings can arise that despite using SSL a web page is partially serving insecure content The browser may not want users to think a site is totally secure but warning can be off-putting to many users There are proxy caching problems Everything is encrypted including packet headers and content Any caching that might have happened between the points at which data is encrypted and decrypted is blocked</p>	8



Question	Answer	Marks
9	<p>Advantages</p> <p>Messages can't be read by any third-party</p> <p>A certificate guarantees the information a browser is receiving originates at the expected domain</p> <p>It's a guarantee that when a user sends sensitive data, it's being sent to the right place, and not to a malicious third party</p> <p>HTTPS connections make man-in-the-middle attacks much more difficult to execute</p> <p>Search engines list HTTPS websites higher than sites without HTTPS</p> <p>The green padlock indicates that your site provider takes security seriously and this gives users confidence</p>	

Question	Answer	Marks
10	<p><b>Max five</b> from:</p> <p>Data resources such as databases</p> <p>Hardware resources of a system</p> <p>People management and project management applications</p> <p>Decision support systems/computer program applications used by managers to gather information to support problem solving and decision making</p> <p>Executive information systems/a reporting tool that provides quick access to summarised reports coming from all departments</p> <p>Marketing Information Systems/systems designed specifically for managing the marketing aspects of the business</p> <p>Accounting information systems for accounting functions</p> <p>Human resource management systems/systems used for personnel aspects of an organisation/storing records/information about employees</p> <p>Office automation systems automate workflow, eliminating bottlenecks</p> <p>School Information Management Systems cover school administration</p> <p><b>Max three</b> from:</p> <p>MIS manager analyses business problems</p> <p>MIS manager designs and maintains computer applications to solve the organisation's problems</p> <p>MIS manager is responsible for training employees to use the system</p>	<b>6</b>

Question	Answer	Marks
11(a)	<p><b>Three</b> from:</p> <p>She could use carbon copy paper (which requires less filling of the sheet feeder)</p> <p>She could use continuous stationery which would require less human interaction/doesn't run out of paper as quickly as inkjet</p> <p>The ink ribbon lasts longer/cheaper to buy than an inkjet cartridge, saving costs</p> <p>When the ink runs out on an inkjet printout is less legible, whereas with a dot matrix printer the print gets fainter but is still legible</p>	<b>3</b>

Question	Answer	Marks
11(b)	<p><b>Three</b> from:</p> <p>The striking of the heads causes a lot of noise which would be distracting in an office environment</p> <p>The quality of output is not so good with a maximum of 240 dpi whereas inkjets output at 1200 dpi</p> <p>The speed of output is not as high as an inkjet printer, with the fastest dot matrix only approaching the speed of the slowest inkjet</p> <p>The cost of a dot matrix printer <u>to buy</u> is far more expensive than a typical inkjet</p> <p>Dot matrix has a more limited character set.</p>	<b>3</b>

Question	Answer	Marks
12	<p><b>Eight</b> from:</p> <p>Advantages</p> <p>Easier for workers to share work/files in projects</p> <p>Can access work from any computer</p> <p>Easier for network manager to roll out new software</p> <p>Easier for managers to monitor workers' progress</p> <p>Peripherals can be shared so fewer needed, leading to lower cost in the future</p> <p>Company can have an intranet for workers to access</p> <p>If a server is used workers do not need to worry about making backups</p> <p>Disadvantages</p> <p>A server may be required to cope with extra computers, so more expensive</p> <p>Extra network points/cabling may be needed, which leads to more cost</p> <p>If the server breaks down company projects might become inaccessible</p> <p>Viruses are easier to transmit from one computer to another</p> <p>Easier for disgruntled employees to hack into colleagues' work</p> <p>A network manager/administrator may need to be employed, leading to extra costs</p> <p><b>Must have at least two of each to gain full marks</b></p> <p><b>Needs to be a proper discussion to gain full marks</b></p>	<b>8</b>