Cambridge International AS & A Level

Cambridge International Examinations
Cambridge International Advanced Subsidiary and Advanced Level

COMPUTER SCIENCE **9608/12**

Paper 1 Written Paper **May/June 2017**

MARK SCHEME

Maximum Mark: 75

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 will not enter into discussions about these mark schemes.

Cambridge is publishing the mark schemes for the May/June 2017 series for most Cambridge IGCSE®, Cambridge International A and AS Level and Cambridge Pre-U components, and some Cambridge O Level components.

<table>
<tr><th>Question</th><th>Answer</th><th>Marks</th></tr>
<tr><td>1(a)</td><td>Many-to-many relationship</td><td>1</td></tr>
<tr><td>1(b)(i)</td><td> 

Both entities correctly labelled 1
Correct relationship between SHOP and SHOP-SUPPLIER 1
Correct relationship between SUPPLIER and SHOP-SUPPLIER 1</td><td>3</td></tr>
<tr><td>1(b)(ii)</td><td>
<table>
<tr><th>Table</th><th>Primary key</th><th>Foreign keys(s) (if any)</th><th>Explanation</th></tr>
<tr><td>SHOP</td><td>ShopID</td><td>None</td><td></td></tr>
<tr><td>SUPPLIER</td><td>SupplierID</td><td>None</td><td></td></tr>
<tr><td>SHOP-SUPPLIER</td><td>ShopID AND SupplierID</td><td>ShopID OR SupplierID

(or both)</td><td>To create a link with the SHOP or SUPPLIER table.</td></tr>
</table>
• SHOP has primary key ShopID and SUPPLIER has primary key SupplierID 1
• SHOP-SUPPLIER has primary key ShopID + SupplierID 1
• Both SHOP and SUPPLIER show foreign key as ‘None’ 1
• SHOP-SUPPLIER shows foreign key ShopID or SupplierID 1
• Explanation for SHOP-SUPPLIER foreign key describes ShopID or SupplierID creating a link 1</td><td>5</td></tr>
<tr><td>1(b)(iii)</td><td>Two from:
• The database user will <u>frequently</u> want to search on contact name 1
• The contact name attribute has been indexed 1
• It allows for a <u>fast/faster</u> search using contact name 1</td><td>Max 2</td></tr>
<tr><td>1(c)(i)</td><td><pre>SELECT ShopID, Location 1
FROM SHOP 1
WHERE RetailSpecialism = 'GROCERY'; 1</pre></td><td>3</td></tr>
<tr><td>1(c)(ii)</td><td><pre>INSERT INTO SHOP-SUPPLIER 1
(ShopID, SupplierID) 1
VALUES (8765, 'SUP89'); 1</pre></td><td>3</td></tr>
</table>

Question	Answer	Marks
2(a)	**One** mark for each pair of rows **Type of printer** **Laser** | **Inkjet** **Impact printer** | | | } **1** **Non-impact printer** | ✓ | ✓ | **Line printer** | | ✓ | } **1** **Page printer** | ✓ | |	**2**
2(b)(i)	**Five** from: • The print head contains a large number of very small nozzle**s** 1 • Ink is fed to each nozzle from a reservoir 1 • The print head fires droplets of ink onto the paper 1 • The print head moves horizontally across the paper 1 **Either:** • Tiny resistors create heat inside each nozzle 1 • The heat vaporises ink to create a bubble 1 • When the bubble pops the ink is deposited on the page 1 • The collapsing bubble creates a partial vacuum in the nozzle 1 • And ink is drawn from the reservoir ready for printing the next dot 1 **Or:** • There is a piezo crystal at the back of the ink reservoir of each nozzle 1 • The crystal vibrates when it receives a tiny electric charge 1 • Ink is forced out of the nozzle by the inward vibration 1 • The outward vibration creates a partial vacuum in the nozzle 1 • Replacement ink is pulled into the reservoir 1	**Max 5**
2(b)(ii)	**Two** from: • The (print head) stepper motor is connected to the print head by a belt 1 • The (print head) stepper motor moves the print head across the paper 1 • The (parking) stepper motor parks the print head assembly when not in use 1 • The (paper feed)stepper motor turns the rollers that provide the paper feed // The (paper feed)stepper motor moves the paper in small increments 1	**Max 2**
2(c)(i)	**Two** from: • External hard drive // External HDD 1 • External flash drive // External SSD 1 • Pen drive 1	**Max 2**

Question	Answer	Marks
2(c)(ii)	**One** from: *(External) Hard drive* Inexpensive per unit of storage 1 Larger storage capacity than flash drive 1 **Or:** *Pen drive // (External) flash drive* No moving parts / noise 1 Low latency // fast access times 1 Robust 1	**Max 1**

Question	Answer	Marks
3(a)	*Definition*: **Max two** from: • The number of distinct values available to encode/represent each sample 1 • Specified by the number of bits used to encode the data for one sample 1 • Sometimes referred to as bit depth 1 *Explanation:* **Max two** from: • A larger sampling resolution will mean there are more values available to store each sample 1 • A larger sampling resolution will improve the accuracy of the digitised sound // A larger sampling resolution will decrease the distortion of the sound 1 • Increased sampling resolution means a smaller quantization error 1	**Max 3**
3(b)(i)	**One** from: • The number of pixels per unit measurement 1 • The number of pixels in an image 1 • The number of pixels wide by the number of pixels high 1 • Number of pixels per row by the number of rows 1	**1**
3(b)(ii)	4	**1**
3(b)(iii)	*Working*: **Max two** from: • Number of pixels is 8192 × 256 1 • One pixel will be stored as one byte 1 • Number of kilobytes = (8192 × 256) / 1024 1 *Answer:* **One** mark: Number of kilobytes = 2048 KB 1	**3**
3(b)(iv)	**Two** from: • Confirmation that the file is a BMP 1 • File size 1 • Location/offset of image data within the file 1 • Dimensions of the image (in pixels) // image resolution 1 • Colour depth (bits per pixel, 1, 4, 8, 16, 24 or 32) 1 • Type of compression used, if any 1	**Max 2**

Question	Answer	Marks
4(a)(i)	**Two** from: • The hardware is unusable without an OS // hides complexity of hardware from user 1 • Acts as an interface/ controls communications between user and hardware / hardware and software // or by example 1 • Provides software platform / environment on which other programs can be run 1	**2**
4(a)(ii)	**One** mark for the name and **one** mark for description. **Max two** management tasks. • Provides the Human Computer Interface (HCI) 1 Controls communications between user and hardware// or by example 1 • Main memory management 1 Memory protection to ensure that two programs do not try to use the same space // Use of virtual memory // Location of processes within the memory // By example 1 • File / Secondary storage management 1 Maintains directory structures // Provides file naming conventions // Controls access 1 • Peripheral / hardware / device / Input-Output management 1 Installation of appropriate driver software // Controls access to data being sent to/from hardware/peripherals // Controls access to hardware/peripherals // manages communication between devices. 1 • Interrupt handling 1 Identifies priorities of interrupts // Saves data on power outage // Loads appropriate Interrupt Service Routine (ISR) // By example 1 • Security management 1 Makes provision for recovery when data is lost // Provides usernames and passwords // Prevents unauthorised access // Ensures privacy of data 1	**Max 4**
4(b)(i)	File compression software	**1**
4(b)(ii)	Backup software	**1**
4(b)(iii)	Disk defragmenting software	**1**
4(b)(iv)	Anti-virus software	**1**

Question	Answer	Marks
5(a)(i)	351	**1**
5(a)(ii)	355	**1**
5(a)(iii)	22	**1**

Question	Answer	Marks
5(a)(iv)	86	**1**
5(b)	**Op code** **Operand** 0 0 0 1 0 0 1 0 0 1 0 0 0 0 1 1 0 0 0 1 0 1 0 1 0 0 0 0 0 1 1 1 Both correct op codes 1 Operand `0100 0011` 1 Operand `0000 0111` 1	**3**
5(c)(i)	`14 5E` `14` 1 `5E` 1	**2**
5(c)(ii)	`LDR #77` `LDR` 1 `#77` 1	**2**

Question	Answer	Marks
6(a)	**Two** from: • The file is made available from a web/email/FTP server 1 • The user's browser is the client software 1 • The client (software browser) requests the file from the server 1 • The desired file is returned to the client computer 1	**Max 2**
6(b)	1. The user keys in the Uniform Resource Locator (URL) into the browser Software. 2. **E** // The Domain Name Service (DNS) uses the domain name from the browser to look up the IP address of the web server. 1 3. **D** // The web server retrieves the page 1 4. **F** // Sends the web page content to the browser 1 5. **B** // Browser software renders the page and displays 1	**4**
6(c)(i)	`Output1`, `Output2` 1 `RunnerID` // `Runner ID` 1	**2**
6(c)(ii)	6 – 21	**1**
6(c)(iii)	13	**1**
6(c)(iv)	Checks that the `RunnerID` entered starts with the characters CAM or VAR only	**1**
6(c)(v)	**Two** checks from: **One** mark for check and **one** mark for description • Format check 1 `RunnerID` is three letter characters followed by two digit characters //`Position` is digit characters only 1 • Length check 1 `RunnerID` has exactly five characters 1 • Range check 1 The value for `Position` is between1 and (say) 50 1 • Presence check 1 The text box for `RunnerID` or `Position` is not empty 1 • Existence check 1 To ensure that `RunnerID` has been registered 1 • Uniqueness check 1 To ensure no two runners have the same number 1	**Max 4**