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

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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.

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<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>SELECT ShopID, Location 1
FROM SHOP 1
WHERE RetailSpecialism = 'GROCERY'; 1</td><td>3</td></tr>
<tr><td>1(c)(ii)</td><td>INSERT INTO SHOP-SUPPLIER 1
(ShopID, SupplierID) 1
VALUES (8765, 'SUP89'); 1</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** — ✓ **Non-impact printer** — ✓ ✓ **1** **Line printer** — ✓ **Page printer** — ✓ **1**	**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**