
COMPUTER SCIENCE

9608/12

Paper 1 Written Paper

May/June 2017

MARK SCHEME

Maximum Mark: 75

Published

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This document consists of **7** printed pages.

Question	Answer	Marks																
1(a)	Many-to-many relationship	1																
1(b)(i)	 <p>Both entities correctly labelled 1 Correct relationship between SHOP and SHOP-SUPPLIER 1 Correct relationship between SUPPLIER and SHOP-SUPPLIER 1</p>	3																
1(b)(ii)	<table border="1"> <thead> <tr> <th>Table</th> <th>Primary key</th> <th>Foreign keys(s) (if any)</th> <th>Explanation</th> </tr> </thead> <tbody> <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> </tbody> </table> <ul style="list-style-type: none"> • 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 	Table	Primary key	Foreign keys(s) (if any)	Explanation	SHOP	ShopID	None		SUPPLIER	SupplierID	None		SHOP-SUPPLIER	ShopID AND SupplierID	ShopID OR SupplierID (or both)	To create a link with the SHOP or SUPPLIER table.	5
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SHOP-SUPPLIER	ShopID AND SupplierID	ShopID OR SupplierID (or both)	To create a link with the SHOP or SUPPLIER table.															
1(b)(iii)	<p>Two from:</p> <ul style="list-style-type: none"> • 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 	Max 2																
1(c)(i)	<pre>SELECT ShopID, Location FROM SHOP WHERE RetailSpecialism = 'GROCERY';</pre>	3																
1(c)(ii)	<pre>INSERT INTO SHOP-SUPPLIER (ShopID, SupplierID) VALUES (8765, 'SUP89');</pre>	3																

Question	Answer	Marks																						
2(a)	<p>One mark for each pair of rows</p> <table border="1"> <thead> <tr> <th></th> <th colspan="2">Type of printer</th> <th></th> </tr> <tr> <th></th> <th>Laser</th> <th>Inkjet</th> <th></th> </tr> </thead> <tbody> <tr> <td>Impact printer</td> <td></td> <td></td> <td rowspan="2">} 1</td> </tr> <tr> <td>Non-impact printer</td> <td>✓</td> <td>✓</td> </tr> <tr> <td>Line printer</td> <td></td> <td>✓</td> <td rowspan="2">} 1</td> </tr> <tr> <td>Page printer</td> <td>✓</td> <td></td> </tr> </tbody> </table>		Type of printer				Laser	Inkjet		Impact printer			} 1	Non-impact printer	✓	✓	Line printer		✓	} 1	Page printer	✓		2
	Type of printer																							
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Non-impact printer	✓	✓																						
Line printer		✓	} 1																					
Page printer	✓																							
2(b)(i)	<p>Five from:</p> <ul style="list-style-type: none"> • The print head contains a large number of very small nozzles 1 • Ink is fed to each nozzle from a reservoir 1 • The print head fires <u>droplets</u> of ink onto the paper 1 • The print head moves horizontally across the paper 1 <p>Either:</p> <ul style="list-style-type: none"> • 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 <p>Or:</p> <ul style="list-style-type: none"> • 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)	<p>Two from:</p> <ul style="list-style-type: none"> • 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)	<p>Two from:</p> <ul style="list-style-type: none"> • External hard drive // External HDD 1 • External flash drive // External SSD 1 • Pen drive 1 	Max 2																						

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

Question	Answer	Marks
3(a)	<p><i>Definition: Max two</i> from:</p> <ul style="list-style-type: none"> • 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 <p><i>Explanation: Max two</i> from:</p> <ul style="list-style-type: none"> • 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)	<p>One from:</p> <ul style="list-style-type: none"> • The <u>number of pixels</u> per <u>unit measurement</u> 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)	<p><i>Working: Max two</i> from:</p> <ul style="list-style-type: none"> • Number of pixels is 8192×256 1 • One pixel will be stored as one byte 1 • Number of kilobytes = $(8192 \times 256) / 1024$ 1 <p><i>Answer: One</i> mark:</p> <p>Number of kilobytes = 2048 KB 1</p>	3
3(b)(iv)	<p>Two from:</p> <ul style="list-style-type: none"> • 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: <ul style="list-style-type: none"> • 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 <u>platform / environment</u> 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. <ul style="list-style-type: none"> • 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)	<table style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th style="width: 50%; text-align: center;">Op code</th> <th style="width: 50%; text-align: center;">Operand</th> </tr> </thead> <tbody> <tr> <td style="text-align: center;"> <table border="1" style="display: inline-table; border-collapse: collapse;"> <tr> <td style="padding: 2px 5px;">0</td><td style="padding: 2px 5px;">0</td><td style="padding: 2px 5px;">0</td><td style="padding: 2px 5px;">1</td><td style="padding: 2px 5px;">0</td><td style="padding: 2px 5px;">0</td><td style="padding: 2px 5px;">1</td><td style="padding: 2px 5px;">0</td> </tr> </table> </td> <td style="text-align: center;"> <table border="1" style="display: inline-table; border-collapse: collapse;"> <tr> <td style="padding: 2px 5px;">0</td><td style="padding: 2px 5px;">1</td><td style="padding: 2px 5px;">0</td><td style="padding: 2px 5px;">0</td><td style="padding: 2px 5px;">0</td><td style="padding: 2px 5px;">0</td><td style="padding: 2px 5px;">1</td><td style="padding: 2px 5px;">1</td> </tr> </table> </td> </tr> <tr> <td style="text-align: center;"> <table border="1" style="display: inline-table; border-collapse: collapse;"> <tr> <td style="padding: 2px 5px;">0</td><td style="padding: 2px 5px;">0</td><td style="padding: 2px 5px;">0</td><td style="padding: 2px 5px;">1</td><td style="padding: 2px 5px;">0</td><td style="padding: 2px 5px;">1</td><td style="padding: 2px 5px;">0</td><td style="padding: 2px 5px;">1</td> </tr> </table> </td> <td style="text-align: center;"> <table border="1" style="display: inline-table; border-collapse: collapse;"> <tr> <td style="padding: 2px 5px;">0</td><td style="padding: 2px 5px;">0</td><td style="padding: 2px 5px;">0</td><td style="padding: 2px 5px;">0</td><td style="padding: 2px 5px;">0</td><td style="padding: 2px 5px;">1</td><td style="padding: 2px 5px;">1</td><td style="padding: 2px 5px;">1</td> </tr> </table> </td> </tr> <tr> <td colspan="2" style="padding-top: 10px;">Both correct op codes</td> <td style="text-align: right; vertical-align: bottom;">1</td> </tr> <tr> <td colspan="2" style="padding-top: 5px;">Operand 0100 0011</td> <td style="text-align: right; vertical-align: bottom;">1</td> </tr> <tr> <td colspan="2" style="padding-top: 5px;">Operand 0000 0111</td> <td style="text-align: right; vertical-align: bottom;">1</td> </tr> </tbody> </table>	Op code	Operand	<table border="1" style="display: inline-table; border-collapse: collapse;"> <tr> <td style="padding: 2px 5px;">0</td><td style="padding: 2px 5px;">0</td><td style="padding: 2px 5px;">0</td><td style="padding: 2px 5px;">1</td><td style="padding: 2px 5px;">0</td><td style="padding: 2px 5px;">0</td><td style="padding: 2px 5px;">1</td><td style="padding: 2px 5px;">0</td> </tr> </table>	0	0	0	1	0	0	1	0	<table border="1" style="display: inline-table; border-collapse: collapse;"> <tr> <td style="padding: 2px 5px;">0</td><td style="padding: 2px 5px;">1</td><td style="padding: 2px 5px;">0</td><td style="padding: 2px 5px;">0</td><td style="padding: 2px 5px;">0</td><td style="padding: 2px 5px;">0</td><td style="padding: 2px 5px;">1</td><td style="padding: 2px 5px;">1</td> </tr> </table>	0	1	0	0	0	0	1	1	<table border="1" style="display: inline-table; border-collapse: collapse;"> <tr> <td style="padding: 2px 5px;">0</td><td style="padding: 2px 5px;">0</td><td style="padding: 2px 5px;">0</td><td style="padding: 2px 5px;">1</td><td style="padding: 2px 5px;">0</td><td style="padding: 2px 5px;">1</td><td style="padding: 2px 5px;">0</td><td style="padding: 2px 5px;">1</td> </tr> </table>	0	0	0	1	0	1	0	1	<table border="1" style="display: inline-table; border-collapse: collapse;"> <tr> <td style="padding: 2px 5px;">0</td><td style="padding: 2px 5px;">0</td><td style="padding: 2px 5px;">0</td><td style="padding: 2px 5px;">0</td><td style="padding: 2px 5px;">0</td><td style="padding: 2px 5px;">1</td><td style="padding: 2px 5px;">1</td><td style="padding: 2px 5px;">1</td> </tr> </table>	0	0	0	0	0	1	1	1	Both correct op codes		1	Operand 0100 0011		1	Operand 0000 0111		1	3
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5(c)(ii)	LDR #77 LDR #77	2 1 1																																															

Question	Answer	Marks
6(a)	<p>Two from:</p> <ul style="list-style-type: none"> • The <u>file</u> is made available from a web/email/FTP server 1 • The user's <u>browser</u> is the client software 1 • The client (software browser) <u>requests</u> the <u>file</u> from the server 1 • The desired <u>file</u> is returned to the client computer 1 	Max 2
6(b)	<p>1. The user keys in the Uniform Resource Locator (URL) into the browser Software. 1</p> <p>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</p> <p>3. D // The web server retrieves the page 1</p> <p>4. F // Sends the web page content to the browser 1</p> <p>5. B // Browser software renders the page and displays 1</p>	4
6(c)(i)	<p>Output1, Output2 1</p> <p>RunnerID // Runner ID 1</p>	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)	<p>Two checks from: One mark for check and one mark for description</p> <ul style="list-style-type: none"> • Format check 1 RunnerID is three letter characters followed by two digit characters 1 //Position is digit characters only 1 • Length check 1 RunnerID has exactly five characters 1 • Range check 1 The value for Position is between 1 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