3.2 Hardware – Input & Output Devices
ANSWERS

Question	Answer	Marks
7(a)	Any **two** from e.g. – Barcode **scanner** – QR code **scanner** – Digital camera	**2**
7(b)	Any **six** from: – Proximity/infrared/pressure sensor used – Sensor **continually** sends **digitised** data to microprocessor // When driver pushes button, sensor sends **digitised** data to the microprocessor – Microprocessor compares data to stored value(s) – If in range/out of range/matches, microprocessor sends **signal** to close the door – **Actuator** used **to close door** – If not in range/out of range/does not match door will not close // If not in range/out of range/does not match actuator not activated/signal not sent as passenger in door // If not in range/out of range/does not match a timer is set to check again // If not in range/out of range/does not match a signal is sent to alert the driver/output a message – This process repeats **until the door can close**	**6**

Question	Answer	Marks
5(a)	Any **one** from: • Level • Pressure • Moisture	**1**
5(b)	Any **Six** from: • Sensor **continually** sends **digitised** data to microprocessor • Microprocessor compares data to stored value(s) • If value is outside range / matches microprocessor sends **signal** to release water to refill water bowl • … bowl filled by set amount // bowl filled for certain time • Actuator used to release water • Whole process repeats **until turned off/stopped**	**6**

Question	Answer	Marks
1	**One** mark for each correct device: • Actuator • Printer • Speaker	**3**

3.2 Hardware – Input & Output Devices
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Question	Answer	Marks
1(a)	**One** mark for a correct device and **one** mark for a corresponding example • Keyboard • … e.g. to type In a shop name • Mouse • … e.g. to click on a shop • Microphone • … e.g. to speak the shop name as a voice command • Touchscreen • … e.g. to select a shop • Barcode scanner • … e.g. to scan a barcode for a voucher • Sensor • … e.g. to detect when a person walks past • Digital camera // webcam • … e.g. to video call for assistance	2

Question	Answer	Marks
1(b)	**One** mark for a correct device and **one** mark for a corresponding example • Display screen / monitor / touchscreen • … e.g. to see a shops location • Speaker // headphones • …. e.g. to hear where a shop is located • Printer • …. e.g. to get a hard copy of shop information • LED/Light • … e.g. to indicate where a shop is on the map	2
1(c)	**One** mark for a correct storage and **one** mark for a corresponding example • Random access memory // RAM • … to store data the is currently being processed • … to store the OS/programs/applications whilst in use • Read only memory // ROM • … to store the start-up instructions • … to store the BIOS	2

3.2 Hardware – Input & Output Devices
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Question	Answer	Marks
1(c)(iii)	Any **two** from: • Does not (normally) support multitouch • Screen **visibility** can be poor in sunlight • Longevity issues • (Normally) lower resolution • Not very sensitive to touch // Lower response time (than capacitive) • Prone to scratches	**2**
1(c)(iv)	Any **one** from: • Capacitive • Infrared	**1**
1(d)	Any **two** from: • Data and instructions are stored in the **same** memory • and can only be fetched one at a time	**2**
1(e)	Any **three** from: • Multitasking • Multiprogramming • Input and output control • Running software • Memory management • Processor management • File management • Handling interrupts • Providing security • Managing user accounts • Batch / real-time processing	**3**
1(f)(i)	• 000001100100 • 000011101011 • 000100101101	**3**

Question	Answer	Marks
1	**One** mark for each correct row	**5**

Component	Input (✓)	Output (✓)	Storage (✓)
actuator		✓	
register			✓
sensor	✓		
mouse	✓		
Digital Versatile Disc (DVD)			✓

3.2 Hardware – Input & Output Devices
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Question	Answer	Marks
4(a)	**One** mark for a type of touchscreen technology, **three** marks for benefits • Resistive • … cheap to **manufacture/buy** • … more simple/easier technology to **manufacture** • … less affected by weather // more waterproof • … does not need bare finger // can be pressed with most things • … screen less likely to shatter/break • … lower power consumption • … (can) support multitouch • Capacitive • … good **visibility** in sunlight • … supports multitouch • … more longevity • … faster response times • … requires less/no pressure • … high quality **image/screen** • … doesn't need to be calibrated • … if screen is shattered, it will still register touch • Infrared • … good **visibility** in sunlight • … supports multitouch • … does not need bare finger // can be pressed with most things • … high quality **image/screen** • … if screen is shattered, it will still register touch • … does not need to be calibrated • … requires less/no pressure • … faster response times	**4**

Question	Answer	Marks
4(b)	**One** mark for the correct storage type and **one** mark for the explanation • Primary storage • Both **directly accessed** by the **CPU**	**2**
4(c)(i)	Any **two** from: • Using serial transmission • Data is sent one bit **at a time** • Data is sent down a single wire	**2**
4(c)(ii)	Any **three** from: • It can charge/power the device • It is a universal/industry standard • Fast rate of data transfer • Supports different data transmission speeds • **Automatically** detects the phone • Backward compatible • Little chance of data being skewed	**3**
4(d)	Any **four** from: • The interrupt signal is **sent to the CPU/processor** • The CPU stops the task it is currently processing … • … to service the interrupt • An interrupt service routine is used (to service the interrupt) • Once the interrupt is serviced, a message is displayed to notify the user of the call	**4**

3.2 Hardware – Input & Output Devices
ANSWERS

Question	Answer	Marks
6(a)	**Four** from: • The device shines a light/laser onto the QR code • Corners of code are used to determine position/orientation • Black and white sections of code reflect light differently • The device captures the light that is reflected back … • … using sensors • The light reflections are converted to binary • Link/URL to **video** is stored in the QR code	4
6(b)	• MP4	1
6(c)	Any **two** from: • Reduces the size of the **file** • Takes up less storage space • Quicker to transmit to device • Use less bandwidth • Less buffering	2
6(d)	**Four** from: • **Display** made up of pixels • … that are arranged in a matrix • LEDs are behind the screen • Light shone at pixels • Can have diffuser is used to distribute light evenly • RGB filters used • … and are mixed to create different colours	4

Question	Answer	Marks
4(a)(i)	1 mark for each completed statement An optical mouse shines a red light from a **Light-Emitting Diode//LED** underneath the mouse. The light **reflects** back from a surface through a lens in the mouse and is converted to a value. This value is transmitted to the computer. The computer then determines the **direction** and **speed** of the movement. When the user presses a key on a keyboard, the key pushes the **switch** on the circuit board. This completes a **circuit**. Signals are sent to the computer that uses the data to calculate which key was pressed.	6
4(a)(ii)	1 mark each e.g. • touchscreen • touchpad • scanner • microphone	2
4(b)	Any three from: • More visible pixels // higher resolution • Higher colour **contrast** (in ambient lighting) // more vivid colours • Colours are (often) more accurate • Image (usually) appears brighter (with same wattage) • Will be stationary so does not need the portability of DLP • Does not need the compactness of DLP • Cost of purchase (usually) less • Run quieter • Any surface can be used as a display • Uses less power • Produces less heat • Does not give the rainbow effect DLP often gives • Longer lasting lamps	3

Question	Answer	Marks
2(a)	– Microphone	1
2(b)	– capacitive	1
2(c)	– interrupt	1

3.2 Hardware – Input & Output Devices
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7)

– Light – Lens – Charge-coupled – Analogue-to-digital – Pixel	**5**

Question	Answer	Marks
4	**One** mark per each correct term in the correct order. – Capacitive – Conductive // Capacitive – Change – Coordinates – Resistive – Circuit – Manufacture	7

Question	Answer	Marks
7	**One** mark per each correct row.	5

Statement	3D scanner (✓)	Barcode reader (✓)	QR code reader (✓)
uses position and alignment markers for orientation when scanning			✓
scans the shape and appearance of an object	✓		
uses reflected light from a laser to convert a black-and-white pattern into binary		✓	(✓)
can often be built into an Electronic Point Of Sale (EPOS) terminal, for example, a supermarket checkout		✓	(✓)
it is an example of an input device	✓	✓	✓

8	One mark for each correct term in the correct order – Switch – Circuit – Current – Calculated – Character – Binary	**6**

Question	Answer	Marks
3(a)	**One** mark per each correct term, in the correct place. – LED – Photoelectric – Lens – Magnifies – Microswitch – USB	**6**
3(b)	Any **two** from: – Keyboard – Microphone – 2D/3D Scanner – Sensor – Touchscreen – Keypad – Webcam – Joystick	**2**

3.2 Hardware – Input & Output Devices
ANSWERS

<table>
<tr><th>Question</th><th>Answer</th><th>Marks</th></tr>
<tr><td>3</td><td>One mark for each device/description
<table>
<tr><th>Name of device</th><th>Description</th></tr>
<tr><td><u>Inkjet</u> Printer</td><td>Uses either thermal bubble or piezoelectric technology</td></tr>
<tr><td>Actuator</td><td>– Operated by signals to cause a physical movement Controls the movement of a machine // by example</td></tr>
<tr><td>DLP//Projector</td><td>Uses thousands of tiny mirrors that can move very quickly to create an image</td></tr>
<tr><td>Mouse</td><td>– Uses rolling ball / optical sensor / laser to detect motion // by example
– Movement echoed on screen // moves curser/pointer (on screen)
– Has scroll wheel / Buttons to allow data input // by example</td></tr>
</table></td><td>4</td></tr>
</table>

3.2 Hardware – Input & Output Devices
ANSWERS

Question	Answer	Marks
4(a)	**Six** from Max **four** from: – Scanned using a barcode reader – Shines (red) **laser/light** – Light is reflected back // white lines reflect light // black lines reflect less light – Sensors/photoelectric cells detect the light – Different reflections/bars give different **binary/digital** values // (pattern) converted to **binary/digital** values – Microprocessor interprets the data – Uses check digit error checking Max **three** from: – Database stores data/barcodes/products/prices – Barcode/value/key transmitted to database/system // Searches for barcode/value/key in the database/system… – … price is returned/found	**6**

Question	Answer	Marks
4(b)(i)	Max **three** from: – Flash storage – Uses transistors/controls gates/floating gates – Can be NAND/NOR technology // Can use flip-flops – Stores data by flashing it onto the chips/device – Controlling/using the flow of electrons through/using transistors/chips/gates – The electric current reaches the control gate and flows through to the floating gate to be stored – When data is stored the transistor is converted from 1 to 0 / 0 to 1	**3**