Name: _____

IAL IT Topic 1 Questions

Date:

Time:

Total marks available:

Total marks achieved: _____

Questions

Q1.

Answer the questions with a cross in the boxes you think are correct ⊠. If you change your mind about an answer, put a line through the box ⊠ and then mark your new answer with a cross ⊠.

Gathii has a blog. He writes articles about wildlife photography for his blog.
He has a large following and thinks he can make money from his blog.

Gathii uses free cloud storage for his images.

His camera produces images that are 4000 pixels high, 6000 pixels wide, and use 12 bits per pixel for storage.

(i) Identify the expression that gives the size of a single image in mebibytes (MiB).

(1)

☐ **A** (4000 × 6000 × 12) / (1024 × 1024)

☐ **B** (4000 × 6000) / (12 × 1000 × 1000)

☐ **C** (4000 × 6000 × 12) / (8 × 1024 × 1024)

☐ **D** (4000 × 6000 × 12) / (8 × 1000 × 1000)

(ii) Gathii wants to upload 100 MiB of images to the cloud storage site.

The site restricts uploads to a maximum of 256 kilobits per second.

Identify the expression that gives the minimum time needed for the images to be uploaded.

(1)

☐ **A** (100 × 1024 × 1024) / (256 / 8 × 1000) seconds

☐ **B** (100 × 1000 × 1000) / (1024 × 1000) seconds

☐ **C** (100 × 1024 × 1024) / (8 × 1000) seconds

☐ **D** (100 × 1000 × 1000) / (0.256 × 1000) seconds

(Total for question = 2 marks)

Q2.

Julie is a website developer. She designs and builds websites to meet the requirements of clients.

Julie creates images for some websites. She licenses these images using creative commons licensing.

State **two** creative commons licence conditions that she could apply.

(2)

1 ....

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2 ....

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(Total for question = 2 marks)

Q3.

Some questions must be answered with a cross in a box (☒). If you change your mind about an answer, put a line through the box (☒) and then mark your new answer with a cross (☒).

A company that sells flowers has replaced its paper-based transaction system with an IT system.

When flowers are delivered to a customer, the driver records the event on a tablet.

On return to the company's premises the delivery records are transferred from the tablet to the company's IT system.

(i) Identify the method that will transfer the records in the shortest time, **once a connection has been made**.

(1)

☒ **A** Bluetooth

☒ **B** USB C cable

☒ **C** Ethernet cable

☒ **D** Micro USB cable

(ii) The tablet is location aware.

Explain how the tablet 'knows' when it is on company premises.

(2)

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(Total for question = 3 marks)

Q4.

Computer software includes system software and applications software.

Installed software may be patched or upgraded.

Describe **one** difference between patching and upgrading software.

(2)

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(Total for question = 2 marks)

Q5.

The country of Varma Loko has several large towns, joined by a toll road.

Every vehicle has a passive RFID tag with a unique ID, linked to the driver's account.

Each entry to the toll road has a check point. It uses a radar set to detect if a vehicle is present or not.

When a vehicle is detected at a check point its tag ID is read. The barrier is then raised to allow the vehicle to pass and dropped again afterwards.

Drivers are charged a fixed toll each time they pass through a check point.

The system updates the driver's account by adding the toll charge.

Drivers must pay into their account at a physical payment point.

Describe how the passive RFID system works.

(3)

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(Total for question = 3 marks)

Q6.

Paula has a network with a home office and wants to add an entertainment room.

Paula has these requirements.

- The existing home office has a PC and network-attached storage device (NAS). These are connected by Ethernet and will remain as they are.
- The internet connection comes into the house in the home office. It will be shared with the rest of the network.
- The rest of the house has a single Ethernet connection from the home office.
- Paula has a laptop that connects to the network by Wi-Fi. This must still be possible.
- The entertainment room will have a media server, a sound system, a projector and a television. These must all have Ethernet connections.
- The sound system will be controlled by the projector via Bluetooth.
- The television will be able to mirror a screen display from any mobile device that has Wi-Fi enabled.

When a video is sent to the projector it requires an Ethernet cable connection but the audio track for that video can be sent to the sound system via Bluetooth.

Explain why the video must be sent by Ethernet but the audio only needs Bluetooth.

(2)

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(Total for question = 2 marks)

Q7.

Mikhail is setting up a local area network (LAN) for his business.

The LAN will only be used by Mikhail and five employees.

Mikhail's employees often need to transfer large video files over the network.

The Ethernet cables connecting the LAN are rated at 10 gigabits per second.

(i) Construct an expression to show how long it should take, in seconds, to transfer a 20 gibibyte file.

You do **not** need to do the calculation.

(3)

(ii) In practice, file transfer speeds do not reach 10 gigabits per second.

Give **two** reasons why file transfer speeds do not reach 10 gigabits per second in this cable network.

(2)

1 ....

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2 ....

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(Total for question = 5 marks)

Q8.

A new purpose-built sixth form college will be opening next year.

The college will have 1200 students.

The college has these decisions to make.

1.   Whether students will be allowed to use their own digital devices for their college work or only be able to use college-provided hardware.

2.   Whether to use web-based software applications, such as online productivity apps, or locally-installed software.

Evaluate the options and make recommendations on the decisions that the college should make. You could consider:

- technical support
- security
- connectivity.

(Total for question = 12 marks)

Q9.

Sarah has purchased a smart TV. The features of the TV allow her to browse the internet, deal with email and use interactive media.

Sometimes when Sarah turns her TV on, a message is displayed saying that the firmware is being updated.

(i) State **one** type of memory used to store firmware.

(1)

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(ii) One function of a TV's firmware is to store the operating system.

Give **two** other functions of the firmware.

(2)

1 ....

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2 ....

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(Total for question = 3 marks)

Q10.

Some questions must be answered with a cross in a box (⊠). If you change your mind about an answer, put a line through the box (⊠) and then mark your new answer with a cross (⊠).

Website traffic statistics show that mobile devices, such as smartphones, are now used more often than desktop PCs.

Desktop PCs use firmware during the startup process.

(i) Identify the item that **must** be present in the firmware for a PC to be able to start.

(1)

⊠ **A**   Video driver

☒ **B** Operating system

☒ **C** Bootloader

☒ **D** Processor

(ii) State the type of memory used to store firmware.

(1)

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(Total for question = 2 marks)

Q11.

Sarah has purchased a smart TV. The features of the TV allow her to browse the internet, deal with email and use interactive media.

Digital devices, such as Sarah's TV, have features to assist those with disabilities.

(i) Describe **two** features of a smart TV's user interface that assist people with a visual impairment.

(4)

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(ii) Explain **one** moral/ethical reason why manufacturers of digital devices include accessibility features in their products.

(3)

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(Total for question = 7 marks)

Q12.

Visitors to the botanic garden can pay the entry fee by using a near-field communication (NFC) card.

(i) Describe **two** security risks of using NFC transmission for this purpose.

(4)

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(ii) Explain **one** method of protecting the data being transmitted by NFC.

(2)

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(Total for question = 6 marks)

Q13.

A botanic garden sells plants in its own shop.

The shop attaches a passive radio-frequency identification (RFID) tag to each plant.

(i) Describe how passive RFID tags work.

(4)

(ii) One use of RFID tags is to help reduce theft.

Give **one other** way that the shop could make use of the RFID tags on the plants.

(1)

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(Total for question = 5 marks)

Q14.

A botanic garden uses quick response (QR) codes to label trees so that visitors can view information about them using a QR scanner.

Figure 1 shows an example of a QR code.

Figure 1

The pattern of squares holds data that displays as text when read by a scanner.

All QR codes include additional information that enables a scanner to read them.

State **three** items of additional information included in a QR code.

(3)

1 ....

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2 ....

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3 ....

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(Total for question = 3 marks)

Q15.

A school purchases 30 desktop PCs for its network.

The PCs come with system software but no applications software.

The Head of IT wants to install an art package on the desktop PCs.

She is considering three different licensing options:

- multiple user
- institutional
- network.

Discuss the suitability of these licensing options for the school.

(6)

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(Total for question = 6 marks)

Q16.

A regional educational centre employs teachers to work with local schools.
The teachers travel between the schools. They do not have offices in either the schools or the centre. Anika is one of the teachers.

Anika teaches music. She listens to digital recordings of her students' performances. She wants to buy new speakers.

Analogue signals must be converted to digital values before storing on a computer.

(i) A sound has been recorded with a sample rate of 16 bits/44.1 kHz.

Identify the statement that correctly describes what this means.

(1)

☒ **A**   The sound wave is broken down into 16-bit chunks. Each chunk is stored as a value between 0 and 44.1.

☒ **B**   The maximum amplitude of the sound wave is 44100 Hertz. The amplitude is measured in 16-bit segments.

☒ **C**   The sound wave is measured 44100 times per second. Each measurement is stored in 16 bits.

☒ **D**   The amplitude of the sound wave is measured 16 times per second. Each measurement is stored as a value between 0 and 44100.

(ii) The speakers have a frequency response of (+/-3 dB) 60-25,000 Hz.

Identify the statement that correctly describes what this means.

(1)

☒ **A**   The measure of the variation in volume for each frequency in the given range.

☒ **B**   The margin of error for each measurement of frequency.

☒ **C**   The number of times the speaker cones vibrate each second with an accuracy of +/-3.

☒ **D**   The total number of decibels needed to represent each individual frequency between the top and the bottom end.

(Total for question = 2 marks)

Q17.

In the country of Varma Loko, main roads often run through small villages. The Transport Ministry has installed a traffic management system in each village.

One crossroads in each village has a set of traffic lights controlling the main road and the side roads. The system is controlled by a computer.

These are the system requirements.

• The default setting is for the lights on the main road to be green (go) and the lights on the side roads to be red (stop).

- Proximity and speed sensors are used to detect the two conditions for when the lights will change.
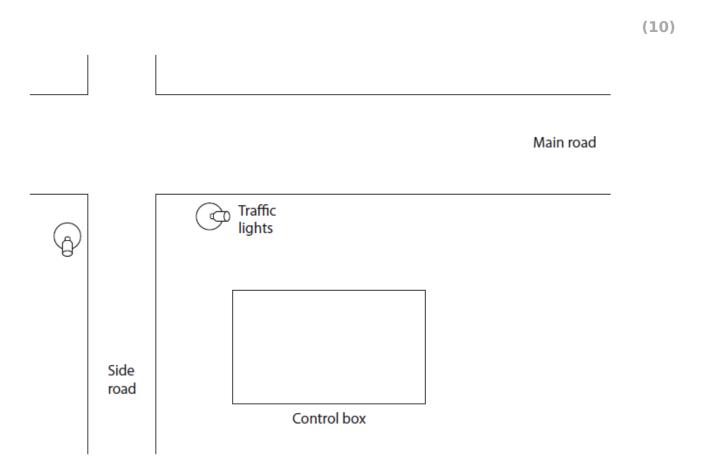
The conditions are:

- when a vehicle stops at a red light on the side road

- when a vehicle enters the village on a main road over the speed limit.

- An emergency vehicle can send a radio signal to change the lights.

- The lights reset to the default setting after a set time.

- If a vehicle moves past a red light on any road, a digital camera takes a photo and uploads it to the local police headquarters via the internet.

You only need to show devices and connections for the lower side road and the right-hand part of the main road.

You should:

- represent a cable connection by a solid line
- represent a wireless connection by a line of dashes
- represent network components by a labelled box or symbol
- include appropriate network components in the control box.

(10)

Main road

Traffic lights

Side road

Control box

(Total for question = 10 marks)

Q18.

Paula has a network with a home office and wants to add an entertainment room.
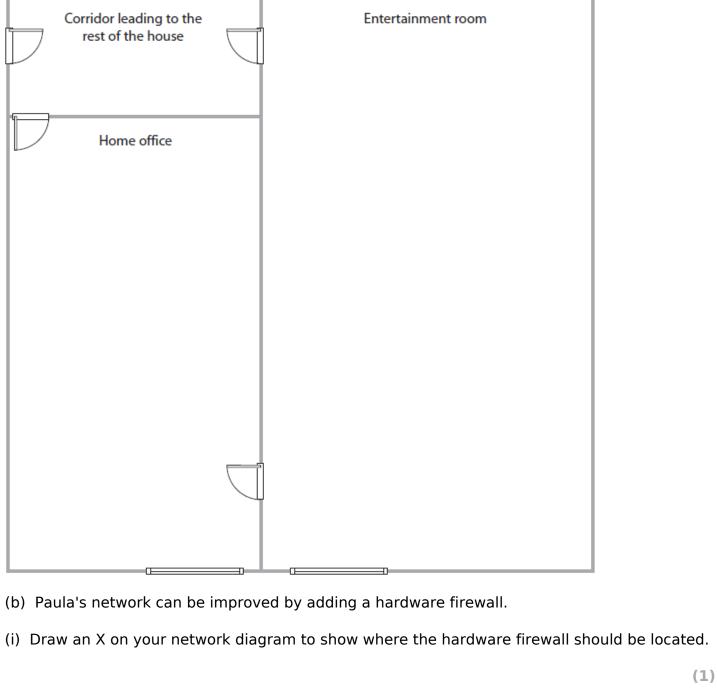
Paula has these requirements.

- The existing home office has a PC and network-attached storage device (NAS). These are connected by Ethernet and will remain as they are.
- The internet connection comes into the house in the home office. It will be shared with the rest of the network.
- The rest of the house has a single Ethernet connection from the home office.
- Paula has a laptop that connects to the network by Wi-Fi. This must still be possible.
- The entertainment room will have a media server, a sound system, a projector and a television. These must all have Ethernet connections.
- The sound system will be controlled by the projector via Bluetooth.
- The television will be able to mirror a screen display from any mobile device that has Wi-Fi enabled.

(a) Complete the diagram to show a network design that will meet Paula's requirements.

You must:

- represent an Ethernet connection by a solid line
- represent a wireless connection by a line of dashes.

You may represent network components by a labelled box or symbol.

(10)

(b) Paula's network can be improved by adding a hardware firewall.

(i) Draw an X on your network diagram to show where the hardware firewall should be located.

(1)

(ii) Explain **one** advantage of a hardware firewall over a software firewall.

(2)

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(c) When a video is sent to the projector it requires an Ethernet cable connection but the audio track for that video can be sent to the sound system via Bluetooth.

Explain why the video must be sent by Ethernet but the audio only needs Bluetooth.

(2)

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(Total for question = 13 marks)

Q19.

A bus company provides hop-on hop-off buses for tourists.

The buses run on four routes, stopping at tourist attractions. Speakers by each seat give a commentary on what can be seen as a bus travels around its route.

Customers purchase tickets for one or more routes.

The bus company controls the buses and ticketing from servers at the main bus station.

There is a hot backup system at a secondary bus station. The hot backup duplicates the main system. It is updated in real time and can take over immediately if needed.

A mesh Wi-Fi network links bus stations, buses, and bus stops.

Tickets may be purchased at numerous shops around the city. A ticket is a plastic card holding details of the routes and the date for which it is valid.

Ticket outlets and buses have near field communication (NFC) devices that can read from and write to the tickets.

Each bus stop has a display screen. The screen shows the route and estimated arrival time of the next five buses.

Each bus has a GPS receiver. The buses report their position every minute and the servers update the display screens.

Complete the diagram to show a network design for the system.

Indicate:

- wired connections by solid lines
- fibre optic connections by double solid lines
- wireless connections by dashed lines

- network components by labelled symbols.

(Total for question = 12 marks)

Q20.

A school purchases 30 desktop PCs for its network.

The PCs come with system software but no applications software.

One role of an operating system is to manage security.

Explain **one** way in which an operating system could manage security in the school's network.

(2)

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(Total for question = 2 marks)

Q21.

A school purchases 30 desktop PCs for its network.

The PCs come with system software but no applications software.

(i) State the purpose of system software.

(1)

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(ii) State the purpose of applications software.

(1)

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(Total for question = 2 marks)

Q22.

Answer the question with a cross in the box you think is correct (☒). If you change your mind about an answer, put a line through the box (☒) and then mark your new answer with a cross (☒).

Sarah has purchased a smart TV. The features of the TV allow her to browse the internet, deal with email and use interactive media.

(i) Identify the statement that **best** describes Sarah's TV.

(1)

☒ **A** The TV is an example of technological convergence

☒ **B** It is safer to browse with the TV than with a laptop

☒ **C** The TV is an example of parallel development

☒ **D** Sarah can store her email messages on the TV

(ii) The TV contains an embedded system.

Identify the statement that **best** describes an embedded system.

(1)

☒ **A** An embedded system must contain flash memory

☒ **B** An embedded system is controlled by an external control unit

☒ **C** An embedded system is designed to perform a small number of specific functions

☒ **D** An embedded system must remain powered at all times

(Total for question = 2 marks)

Q23.

Website traffic statistics show that mobile devices, such as smartphones, are now used more often than desktop PCs.

A smartphone is an example of technological convergence. In the early 2000s, mobile phones were given extra features, such as text messaging. Since then they have been developed to perform other tasks that previously could only be done using a PC.

Give **two** tasks, apart from text messaging, that a smartphone can be used for that previously could only be done using a PC.

(2)

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2 ....

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(Total for question = 2 marks)

Q24.

A regional educational centre employs teachers to work with local schools.
The teachers travel between the schools. They do not have offices in either the schools or the centre. Anika is one of the teachers.

The teachers still need to work with each other and with the administrative team at the centre.

(i) Describe **two** ways in which using IT can enable Anika to work effectively.

(4)

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(ii) Explain **one** way in which this working arrangement benefits the regional educational centre.

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(Total for question = 6 marks)

Q25.

Computer software includes system software and applications software.

Sometimes a software update may cause compatibility problems.

Explain **two** reasons why compatibility may be a problem.

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Q26.

An online-only bank needs to store large amounts of data about its customers.
Each customer can generate many transactions every day.

The online bank uses multi-user software licensing.

Describe how multi-user software licensing works.

(2)

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(Total for question = 2 marks)