4 There are many types of user interface in computerised systems. Three types are a graphical user interface, a dialogue interface and a gesture based interface.

Evaluate these types of user interface.

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Question	Answer	Marks
4	***Eight* from:** Users with physical handicaps may not be able to use a keyboard or mouse… …or control their limbs accurately… …could speak into a microphone to control a device For reasons of hygiene a doctor may not be allowed to touch a display or device Appropriate gestures/speaking into a microphone are/is a more hygienic way to control the device Gestures may be a quicker way of initiating a response from a device Certain gestures may not be socially acceptable which is not a problem with the other interfaces Some gestures may be unintentional but still initiate a reaction from the device Dialogue interface allows hands free control ensuring safety when driving… …whereas gestures/GUI would need at least one hand to leave the steering wheel Dialogue interface can be more expensive to develop compared with a GUI Dialogue interface may not operate reliably if there is background noise or user has a cold/strong dialect/accent… …whereas GUI/gestures will still be reliable GUIs tend to be more accurate than gestures/dialogue Dialogue interface often requires a training session with user… …GUI/gestures can be taught through manuals Gesture based is less effective when several users/background movement involved *One mark is available for an appropriate reasoned opinion*	8

5 Avtar is a recently appointed network manager in a school. In his role he will need to use a variety of utility software.

(a) Describe, in detail, each of the following utilities.

(i) anti-virus software:

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(ii) data compression:

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(iii) disk defragmentation:

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(iv) disk formatting:

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Question	Answer	Marks
5(a)(i)	Anti-virus software – **Four** *from:* Software used to prevent, detect and remove malicious software Can protect from: malicious Browser Helper Objects (BHOs), browser hijackers, ransomware, keyloggers, backdoors, rootkits, Trojan horses, worms, malicious LSPs, dialers, fraudtools, adware and spyware (must have at least two) Signature-based detection compares the contents of a file to its database of known malware signatures Heuristic-based detection detects malware based on characteristics typically used in known malware code Behavioural-based detection: is based on the behavioural fingerprint of the malware at run-time… …is only able to detect malware after they have starting doing their malicious actions Sandbox detection based on behavioural-based detection… …but doesn't detect the behavioural fingerprint at run time… …it executes the programs in a virtual environment logging what actions the program performs Gives user options to delete or quarantine files/asks if user wants virus deleted Scans computer/files/disk for viruses	4
5(a)(ii)	Data compression – **Three** *from:* Encoding information using fewer bits than the original representation Can be either lossy or lossless Lossless compression reduces number of bits by identifying repeated patterns of data No information is lost in lossless compression Lossy compression reduces number of bits by identifying unnecessary information Storage space required for file/file size is reduced	3
5(a)(iii)	Disk defragmentation – **Three** *from:* Organises the contents of the disk into the smallest number of contiguous regions/fragments Attempts to create larger regions of free space using compaction Some defragmentation utilities try to keep smaller files within a single directory together The movement of the hard drive's read/write heads over different areas of the disk when accessing fragmented files is slower… …compared to accessing the entire contents of a non-fragmented file sequentially	3
5(a)(iv)	Disk formatting – **Two** *from:* Prepares a data storage device for initial use Organises the tracks on a disk into sectors A new disk medium is fully prepared in order to store files The first stage is low-level formatting followed by… …partitioning which makes the data storage device visible to an operating system… followed by high-level formatting which generates a new file system	2

6 High-level languages can be translated using a compiler or an interpreter.

   (a) Describe the features of a compiler.

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   (b) Describe the features of an interpreter.

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Question	Answer	Marks
6(a)	**Three** *from:* Translates the whole program as one complete unit Creates an executable file Is able to report on a number of errors in the code after compilation Does not need to be present in order to run the code Can optimise source code to run as fast or as efficiently as possible.	3
6(b)	**Three** *from:* Translates each line of source code into an intermediate stage and then executes that line/statement Reports on errors as lines of source code are entered Only a few lines of source code needs to be in memory at any one time Some interpreters execute code within a 'virtual machine'… …these have been designed to disallow code from directly accessing the computer.	3

4   Sheila has just become manager of the ticketing department in an airport. She uses computers to accept payments and check passengers' passports.

(a)   Evaluate the input devices which Sheila might use, including their specific use in this system.

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(b) Sheila stores all the records of her transactions and lists of passengers from each flight on a hard disk. She is considering replacing her hard disk drive with a solid state drive (SSD). Evaluate the use of a hard disk drive compared with an SSD.

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Question	Answer	Marks
4(a)	This question to be marked as levels of response:	8

Level 3   **(7–8 marks)**
Candidates will explain both the advantages and disadvantages of different input devices using relevant and appropriate examples.
The information will be relevant, clear, organised and presented in a structured and coherent format.
There may be a reasoned conclusion/opinion.
Specialist terms will be used correctly and appropriately.

Level 2   **(4–6 marks)**
Candidates will explain the advantages and disadvantages of input devices although development of some of the points will be limited to advantages or disadvantages, examples used will be for the most part relevant.
For the most part, the information will be relevant and presented in a structured and coherent format.
There may be a conclusion/opinion.
Specialist terms will be used appropriately and for the most part correctly.

Level 1   **(1–3 marks)**
Candidates will only give advantages/disadvantages of input devices, examples, if used, may lack relevance.
Answers may be in the form of a list.
There will be little or no use of specialist terms.

Level 0   **(0 marks)**
Response with no valid content.

Answers may include:

The use of a keyboard to type in the amounts of money to be paid and recording details of the customers
The advantage of keyboards is that experienced users can enter details more quickly than other methods
Difficulty of entering amounts other than selecting numbers using a mouse
Disadvantage is that data is slow to enter compared with DDE

Touch screen could be used to enter amounts or customer details
Quicker to enter data than using a mouse
May cause screen to be stained and make viewing difficult

RFID reader can be used to enter details from passport
Quicker than manually entering data
Readers are expensive to buy initially

Uses chip reader to read credit/debit cards
More reliable than reading magnetic stripe
Quicker than typing in details from the card
Contactless card readers speed up transactions as no PIN is required.

Question	Answer	Marks
4(b)	*Evaluation based on:* *Advantages* Hard disks tend to have higher storage capacities than SSDs Hard disk drives still cost less per gigabyte than SSDs HDDs last longer than SSDs … …the NAND flash used in SSDs can only be used for a finite number of writes The choice and availability of SSDs is still limited *Disadvantages* Hard Disk Drives are more susceptible to shock and damage… … as they consist of various moving parts SSDs have faster data transfer rate SSDs have quicker boot ups… …can have almost instantaneous data access… …HDDs data access speed is dependent on how close the data is to the read/write heads… …while all parts of the SSD can be accessed at once SSDs use significantly less power at peak load than hard drives… …SSD's energy efficiency can deliver longer battery life in laptops With no moving parts SSDs run at near silent operation… …unlike whirring hard disk drives.	8

11 A manager of a small business wants to update her computer system. When considering which software to use, she has to choose between custom written software and off-the-shelf software.

Describe what is meant by these two types of software.

(a) Custom written:

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(b) Off-the-shelf:

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Question	Answer	Marks
11(a)	**Three** *from:* Software that is specially developed for a specific company/business It is made to accommodate that customer's particular preferences and needs Written by programmers to solve specific problems Owned by the business that commissions it.	3
11(b)	**Three** *from:* Software that is ready-made and already exists It is available to all businesses and companies It is owned by the company that created it Has to be adapted to fit the business that has purchased it.	3

1 **(a)** Tick the **most accurate** statement about the use of a compiler.

	✓
A compiler executes a high-level program one statement at a time before translating the next statement.	
A compiler converts object code into source code.	
A compiler translates machine code into a high-level language program.	
A compiler often produces a separate object code program.	

[1]

(b) Tick the **most accurate** statement about the use of a linker.

	✓
A linker executes a high-level program one statement at a time before translating the next statement.	
A linker takes one or more source code files and combines them into a single executable file.	
A linker takes one or more object files and combines them into a single executable file.	
A linker is used in conjunction with an interpreter.	

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Question	Answer		Marks
1(a)	A compiler executes a high level program one statement at a time before translating the next statement.		1
	A compiler converts object code into source code.		
	A compiler translates machine code into a high level language program.		
	A compiler often produces a separate object code program.	✓	
1(b)	A linker executes a high level program one statement at a time before translating the next statement.		1
	A linker takes one or more source code files and combines them into a single executable file.		
	A linker takes one or more object files and combines them into a single executable file.	✓	
	A linker is used in conjunction with an interpreter.		

4 Jasvinder has just become manager of the ticketing department in an airport. Part of her job is to provide tickets for passengers who have decided to fly at the last minute. She uses computers to produce the tickets. She also has to produce hard copy of the details of every flight, including passenger names, prior to each flight.

Evaluate the output devices which Jasvinder might use, including their specific use in this system.

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Question	Answer	Marks
4	This question to be marked as levels of response: **Level 3 (7–8 marks)** Candidates will explain both the advantages and disadvantages of a range of different output devices using relevant and appropriate examples. The information will be relevant, clear, organised and presented in a structured and coherent format. There may be a reasoned conclusion/opinion. Specialist terms will be used correctly and appropriately. **Level 2 (4–6 marks)** Candidates will explain the advantages and disadvantages of more than one output device. Examples used will be for the most part relevant. For the most part, the information will be relevant and presented in a structured and coherent format. There may be a conclusion/opinion. Specialist terms will be used appropriately and for the most part correctly. **Level 1 (1–3 marks)** Candidates will only address some aspects of the use of output devices. Examples, if used, may lack relevance. Answers may be in the form of a list. There will be little or no use of specialist terms. **Level 0 (0 marks)** Response with no valid content. Answers may include: To print the tickets: The advantage of a laser printer is that the quality of print will be good enabling passengers to see their flight number and seat number clearly An inkjet printer would produce higher quality tickets An inkjet printer may be relatively slow causing queues at the ticketing department A dot matrix printer would not be as clear as a laser printer or inkjet printer A laser printer might not be good for this as it takes some time to produce a first copy and there wouldn't be more than one copy A dot matrix printer may be relatively slow causing queues at the ticketing department Producing the flight lists: The list may be long and it may be difficult to correlate the sheets A dot matrix printer may be better as fan fold stationery could be used Less risk of a dot matrix printer running out of paper Flight lists would be continuous More easily collated using a dot matrix printer May need to change cartridges more frequently if an inkjet printer were used Quality of printout would not be an issue for flight lists Noise of dot matrix would not be an issue at a busy airport.	8

11 Rajvinder and his team of car designers are producing designs for a new model. Their office is on the other side of town from the company's head office. Every month, Rajvinder and the designers report to the company directors by means of a web conference.

Describe how Rajvinder would set up this web conference, assuming that he is using a third party to supply the service and that he has checked that all the hardware and software is working.

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Question	Answer	Marks
11	**Six** *from:*	6
	Send emails to every person being invited informing them of the conference Rajvinder sends log in details to the directors/users Uploads any necessary documents for the meeting Sends a link to the website Enter his user name and password (obtained from the provider) Select a start time and end time In the meeting area, type an agenda Using the software select participants Select appropriate meeting space/room Select those participants who can enter the room Choose those who can be presenters/those that can modify documents Limit the participation of participants/mute volume/disable messaging/disable cameras.	

9 Siegfreid has created a word processed document using 'proprietary software'. Simon has suggested that he should save it in an 'open-source file format'.

(a) Describe what is meant by 'proprietary software'.

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(b) Describe what is meant by an 'open-source file format'.

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Question	Answer	Marks
9(a)	**Three** *from:* Proprietary software is software that is owned by an individual or a company (usually the one that developed it) There are almost always major restrictions on its use A software vendor delineates the specific terms of use in an end-user license agreement Its source code is almost always kept secret Usually covered by copyright which provides a legal basis for its owner to establish exclusive rights.	3

Question	Answer	Marks
9(b)	**Three** *from:* Can be used and implemented by anyone An open source file format can be used by both proprietary and free and open source software Also called free file formats if they are not covered by any copyrights/patents So that anyone may use them at no monetary cost for any desired purpose.	3

12 Paul and his team of programmers are writing software for a new project for a large company. Every month, Paul and the programmers report to the company directors by means of a video-conference.

Describe how Paul would set up and run this video-conference, assuming that the necessary equipment and software has already been purchased and tested.

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Question	Answer	Marks
12	**Six** *from:* Agree a date and time Send a reminder/invitation to the participants shortly before start…. …. including access to password/PIN Adjust webcam so they can be seen Create and enter virtual room(s)/environment Load/examine/share documents using appropriate software Uploads any necessary documents for the meeting Sends a link to the website Enter his user name and password Using the software select participants Select appropriate meeting space/room Select those participants who can enter the room Limit the participation of participants/mute volume/disable messaging/disable cameras Communicate by speaking into a microphone and looking at the webcam.	6

14 Magnetic tape and optical media are used to back up data.

Using examples, evaluate their use in this and other situations.

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Question	Answer	Marks
14	This question to be marked as levels of response: **Level 3 (7–8 marks)** Candidates will explain the advantages and disadvantages of magnetic tape and optical media using relevant and appropriate examples. The information will be relevant, clear, organised and presented in a structured and coherent format. There may be a reasoned conclusion/opinion. Specialist terms will be used correctly and appropriately. **Level 2 (4–6 marks)** Candidates will explain the advantages and disadvantages of magnetic tape and optical media. Examples used will be for the most part relevant. For the most part, the information will be relevant and presented in a structured and coherent format. There may be a conclusion/opinion. Specialist terms will be used appropriately and for the most part correctly. **Level 1 (1–3 marks)** Candidates will give the advantages/disadvantages of magnetic tape and optical media. Examples, if used, may lack relevance. There will be little or no use of specialist terms. **Level 0 (0 marks)** Response with no valid content. Candidates may make reference to e.g. A single magnetic tape stores more data than a single optical disk… …so more appropriate for server backups Single tapes cost more than a single optical disk… …so unlikely to be used by students to back up their work Tapes cost less per unit memory… …so more cost effective for large companies storing lots of data Optical disks are not quite as portable as a tape… …particularly where a large amount of data is stored requiring more disks Both last longer than the technology that reads them however Tape is corrupted if placed near to a magnetic field Optical disks have faster data access times… …so more suitable for non-backup purposes Magnetic tape is less susceptible to damage than optical discs during handling… …as it is completely encased Optical disks are more viable where there are large variations of temperature.	8

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2   Tick the **four** most accurate statements referring to different types of user interface.

	✓
A mouse is essential for entering commands when using a command line interface.	
Computer beginners often prefer to use a command line interface.	
A graphical user interface does not require the user to learn many commands off by heart.	
Users can only draw charts when using a graphical user interface.	
A graphical user interface consists of windows, icons, menus and pointers.	
A microphone is needed to input commands into a dialogue interface.	
A dialogue interface requires the user to be a computer expert.	
A gesture based interface does not require the use of any input devices.	
A gesture based interface usually concentrates on face and hand movements.	
The time taken for a command to be given and the response appearing on the screen is not important in a dialogue based interface.	

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Question	Answer		Marks
2	A mouse is essential for entering commands when using a command line interface.		4
	Computer beginners often prefer to use a command line interface.		
	A graphical user interface does not require the user to learn many commands off by heart.	✔	
	Users can only draw charts when using a graphical user interface.		
	A graphical user interface consists of windows, icons, menus and pointers.	✔	
	A microphone is needed to input commands into a dialogue interface.	✔	
	A dialogue interface requires the user to be a computer expert.		
	A gesture based interface does not require the use of any input devices.		
	A gesture based interface usually concentrates on face and hand movements	✔	
	The time taken for a command to be given and the response appearing on the screen is not important in a dialogue based interface.		

3 An author is using a computer to write a book.

(a) Describe, in detail, how she could use different sets of keys on her keyboard to edit and save the book.

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(b) When the author finishes a chapter she wishes to print it out.

Name **three** appropriate types of printer, and for each one give a different advantage to the author for using it compared to the others.

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Question	Answer	Marks
3(a)	**Three** *from:* Can use ctrl key and other keys to save, print, copy and paste text, find and replace text Can use arrow keys, home, end, page up and page down to navigate through text Can use tab key to indent, delete key to delete forwards, backspace to delete backwards Can use the alphabetic keys to enter the text of the book.	3
3(b)	Dot matrix printer – cheaper to run/ink ribbon is cheaper than cartridges/toner/do not have to refill paper as frequently as the others/ribbon does not need changing as often as the others Inkjet printer – faster to print out work than dot matrix/better quality output than dot matrix Laser printer – do not have to change toner as often as inkjet cartridges/better quality output than dot matrix.	3

2 Tick the **four** most accurate statements referring to hardware and software.

	✓
Compilers and linkers are examples of system software.	
Device drivers and interpreters are examples of application software.	
Word processing and spreadsheets are examples of hardware.	
Software is another name for computer programs.	
Software is written in machine code before being converted to high-level language.	
Viruses are a type of software.	
Malicious bots are a type of hardware.	
System software directly operates the computer hardware.	
Operating systems are types of hardware.	
A mouse and keyboard are the basic software components of a computer.	

[4]

Question	Answer		Marks
2	Compilers and linkers are examples of system software.	✓	4
	Device drivers and interpreters are examples of application software.		
	Word processing and spreadsheets are examples of hardware.		
	Software is another name for computer programs.	✓	
	Software is written in machine code before being converted to high-level language.		
	Viruses are a type of software.	✓	
	Malicious bots are a type of hardware.		
	System software directly operates the computer hardware.	✓	
	Operating systems are types of hardware.		
	A mouse and keyboard are the basic software components of a computer.		

1 Tick the **four** most accurate statements referring to hardware and software.

	✓
Operating systems are examples of hardware.	
An Optical Mark Reader and a Magnetic Ink Character Reader are types of storage device.	
A scanner is a type of software.	
Hardware is another name for the physical parts of a computer system.	
A bar code reader is an example of an input device.	
The CPU of a computer is considered to be hardware.	
A device driver is a type of hardware.	
System and application are the names of two types of software.	
A dot matrix printer is an example of software.	
Applets and apps are examples of hardware.	

[4]

Question	Answer		Marks
1	Operating systems are examples of hardware.		4
	An Optical Mark Reader and a Magnetic Ink Character Reader are types of storage device.		
	A scanner is a type of software.		
	Hardware is another name for the physical parts of a computer system.	✓	
	A bar code reader is an example of an input device.	✓	
	The CPU of a computer is considered to be hardware.	✓	
	A device driver is a type of hardware.		
	System and application are the names of two types of software.	✓	
	A dot matrix printer is an example of software.		
	Applets and apps are examples of hardware.		

5 Joseph has written a program using a high level language. He now needs to get it translated for use on his computer.

Compare and contrast the use of a compiler with an interpreter for this purpose.

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Question	Answer	Marks
5	**Six** *from:* Compiler and interpreter both convert high level programming language to a lower level Both are examples of system software A compiler converts the high-level instructions into machine language An interpreter converts the high-level instruction into some intermediate form and after that the instruction is executed The entire program is compiled before being executed The interpreter translates one statement at a time, executing the statement before moving on to the next one A list of errors is created by the compiler after the compilation process An interpreter stops translating after the first error When executed, the compiled program is executed directly using the machine code An interpreter has to be resident in memory in order for the program to run Interpreted programs can be modified at runtime by adding/changing functions A compiled program has to be recompiled fully even for small modifications to be made.	6

2   Tick the **four** most accurate statements regarding input and output.

	✓
A scanner can be both an input and output device.	
A touch screen can be both an input and output device.	
Input devices allow the user to communicate with the computer's operating system.	
Output devices allow data to be stored electronically for future use.	
Inputs must be converted to analogue data before they can be processed by the computer.	
All inputs always come in the form of digital data.	
A plotter is an output device.	
Outputs always come in the form of a printout.	
A microphone is an input device.	
A pen drive is an input device.	

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Question	Answer		Marks
2	A scanner can be both an input and output device.		4
	A touch screen can be both an input and output device.	✓	
	Input devices allow the user to communicate with the computer's operating system.	✓	
	Output devices allow data to be stored electronically for future use.		
	Inputs must be converted to analogue data before they can be processed by the computer.		
	All inputs come in the form of digital data.		
	A plotter is an output device	✓	
	Outputs always come in the form of a printout.		
	A microphone is an input device.	✓	
	A pen drive is an input device.		

4 **(a)** Describe the advantages of using a web authoring package to create a web page rather than writing HTML code.

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(b) Describe the disadvantages of using a web authoring package to create a web page rather than writing HTML code.

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Question	Answer	Marks
4(a)	**Three** *from:* Do not have to spend time learning HTML/do not have to be an expert/have much experience/many skills to make a fully functional website Most web authoring packages involve basically pointing and clicking to create a web page rather than typing in instructions It is more difficult to remember the various HTML codes for creating web pages Writing HTML would take much longer/it saves time when it comes to creating content/establishing the layout/graphical elements of the page.	3

Question	Answer	Marks
4(b)	**Three** *from:* It limits the user's options as a designer Such programs rely on templates with limited options for the look and feel of the site Depending on the type of software, user may not be able to implement video or other common web-design elements Software may make user completely reliant on it … … if the program suddenly becomes unavailable for some reason user cannot create a website Knowledge of HTML means web pages can be designed regardless of what software is available/only needs a simple text editor.	3

11 A number of items of computer hardware are used for storing data.

Evaluate the use of RAM, ROM and hard disks for this purpose.

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Question	Answer	Marks
11	**Level 3** **(7–8 marks)** Candidates will discuss the importance of RAM, ROM and hard disks including the advantages and disadvantages. Candidates will explain the effectiveness of these items in detail. The information will be relevant, clear, organised and presented in a structured and coherent format. There may be a reasoned conclusion/opinion. Specialist terms will be used correctly and appropriately. **Level 2** **(4–6 marks)** Candidates will discuss the advantages and disadvantages of RAM, ROM and hard disks. For the most part, the information will be relevant and presented in a structured and coherent format. There may be a conclusion/opinion. Specialist terms will be used appropriately and for the most part correctly. **Level 1** **(1–3 marks)** Candidates will present an advantage or disadvantage of two of RAM, ROM and hard disks. Candidates will describe at least one of these items. There will be little or no use of specialist terms. **Level 0** **(0 marks)** Response with no valid content. Candidates may refer to for e.g. RAM / ROM allows quicker access to data than HDD HDD or the Hard Disk Drive stores information for permanent storage/long term whereas RAM only stores information for relatively short-term usage Data in RAM is deleted once the power to the device is stopped RAM stores active program data whereas ROM is unable to RAM stores data that the user is currently working on whereas ROM is unable to Large RAM chips can be read faster than most ROMs ... ... ROM content is sometimes copied to RAM and subsequently read from RAM Hard disks can be portable and easy to move from device to device unlike ROM/RAM Data in RAM can be accessed much faster than the data on a hard disk Hard disk drives are electromechanical devices and more prone to failure than RAM/ROM – no moving parts In a normal computer configuration RAM size is much smaller than the hard disk size ROM cannot be changed by a program or user ROM/HDD retains its data even after the computer is turned off ROM stores the instructions for the computer to start up when it is turned on again Would be expensive to save an operating system on ROM so need hard disk Still need to have boot up instructions to activate hard disk drive so ROM is needed.	8

2   Tick the **four** statements which are true regarding user interfaces.

	✓
The colours used in a dialogue interface are of key importance.	
A mouse is an essential input device when using a command line interface.	
A graphical user interface requires you to type in a large number of instructions.	
A command line interface is mainly used by more advanced computer users.	
A gesture based interface allows users to point with their fingers as a method of input.	
A command line interface needs menus and icons to operate it.	
A dialogue interface can interpret hand movements to carry out commands.	
A gesture based interface is very reliable as most users have similar gestures for communicating.	
The font size is the most important feature of a command line interface.	
A graphical user interface involves the use of windows and pointers.	

[4]

Question	Answer		Marks
2	The colours used in a dialogue interface are of key importance.		4
	A mouse is an essential input device when using a command line interface.		
	A graphical user interface requires you to type in a large number of instructions.		
	A command line interface is mainly used by more advanced computer users.	✓	
	A gesture based interface allows users to point with their fingers as a method of input.	✓	
	A command line interface needs menus and icons to operate it.		
	A dialogue interface can interpret hand movements to carry out commands.		
	A gesture based interface is very reliable as most users have similar gestures for communicating.	✓	
	The font size is the most important feature of a command line interface.		
	A graphical user interface involves the use of windows and pointers.	✓	

3   There are many types of data storage device including hard disk drives, solid state drives, optical drives and magnetic tape drives.

Describe the purpose of these storage devices and how they store data.

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Question	Answer	Marks
3	**Eight** *from:* The purpose of storage devices is to store data and software for later use The purpose of storage devices is to hold data even when the computer is turned off so the data can be used whenever needed/to have non-volatile/permanent/backup copies of data/keep archives Stored data may be loaded back into the CPU for further processing or sent to an output device The device writes data to the medium and reads it from the medium The CPU is able to write data to the hard disk/tape in the form of formatted files The CPU is also able to read data and software from the hard disk/tape in readiness for processing to take place There is no distinction between software and data as far as the storage device is concerned – both are a form of digital data Optical devices such as CD, DVD and Blu-Ray drives all make use of a laser to burn dark pits onto the medium Each dark pit is a binary digit e.g. 1 whilst the absence of a pit is the opposite binary bit e.g. 0 if the pit is a 1 Small areas of a tape/disk are magnetised to represent 1 or 0 Hard disks and magnetic tape have surfaces coated with a magnetically sensitive material such as iron oxide Solid state drives make use of electrical charge to store the data Reading data involves retrieving data from the surface and transferring it into the computer's memory for use.	8

1 Tick the **four** statements, referring to different types of application software, which are true.

	✓
You can use word processing software to create tables of data	
You can only use database software to create reports	
Spreadsheet software can be used to produce charts	
You must always use web authoring software when creating web pages	
Financial modelling can involve the use of spreadsheet software	
Video editing software cannot be used to edit a music soundtrack	
Word processing software can include multimedia features	
You can only create data forms using database software	
Photo editing software is only used to edit photos	
A management information system (MIS) is a form of database management system	

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Question	Answer		Marks
1	You can use word processing software to create tables of data	✓	4
	You can only use database software to create reports		
	Spreadsheet software is used to produce charts	✓	
	You must always use web authoring software when creating web pages		
	Financial modelling can involve the use of spreadsheet software	✓	
	Video editing software cannot be used to edit a music soundtrack		
	Word processing software can include multimedia features		
	You can only create data forms using database software		
	Photo editing software is only used to edit photos		
	A management information system (MIS) is a form of database management system	✓	

4 There are many types of systems software including interpreters and device drivers.

(a) In order for a computer to output to a printer it uses a printer driver. This is just one of many device drivers a computer uses.

Explain the purpose of device drivers.

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(b) Describe the function of an interpreter.

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Question	Answer	Marks
4(a)	**Four** *from:* It operates/controls a device attached to the computer Without the required device driver, the corresponding hardware device fails to work It is an interface between operating systems/applications software and the device Tells the operating system how to communicate with the hardware device Upon installation it detects and identifies the peripheral device Wakes up the device when it is needed and puts it back to sleep when it is not Handles the translation of requests between a device and the computer Defines where outgoing data must be stored before it can be sent At least **two** examples of device drivers.	4
4(b)	**Four** *from:* Directly executes instructions of a high-level language program Translates a high-level language program into an intermediate stage Translates each line of source code and then executes that line/statement Reports on errors as lines of source code are entered An interpreter has to be resident in memory in order for the program to run.	4

8 Rishu has been asked by the directors of the company she works for to set up a fully functioning video-conferencing room. It will be used by several workers at the same time to communicate with the directors who will be in a different building.

Describe, including a use of each item, the hardware she will need to purchase.

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Question	Answer	Marks
8	**Six** *from:* Server/computer to handle video-conferencing software Laptops/PCs/tablets for each participant to enter data Microphones to input participants' voices/sound Large screen/monitor so that all the directors can be seen Speakers for participants to hear what the directors are saying Cameras to input pictures of participants Router to connect to internet/codec to connect to telephone network.	6

12 A recent development in backing storage of laptop computers has been the increased use of solid state drives (SSDs). However hard disk drives (HDDs) are still used in many laptops.

Evaluate the use of SSDs and HDDs for storing data in laptop computers.

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Question	Answer	Marks
12	**Eight** *from:* Evaluation based on: *Advantages of HDDs/Disadvantages of SSDs:* Hard disks tend to have higher storage capacities than SSDs Hard disk drives still cost less per gigabyte than SSDs HDDs last longer than SSDs The NAND flash used in SSDs can only be used for a finite number of writes The choice and availability of SSDs is still limited compared to HDDs *Disadvantages of HDDs/Advantages of SSDs:* Hard disk drives are more susceptible to shock and damage… …as there are moving parts SSDs have faster data transfer rate SSDs have quicker boot ups SSDs can have almost instantaneous data access HDDs data access speeds is dependent on how close the data is to the read/write heads… All parts of the SSD can be accessed at once SSDs use significantly less power at peak load than hard drives… SSD's energy efficiency can deliver longer battery life in laptops than HDDs With no moving parts SSDs run at near silent operation unlike whirring hard disk drives SSDs weigh considerably less than hard drives SSDs make laptops more portable **Must have at least one from each to gain full marks.**	8

2 The management of a hotel is introducing a computer system for producing bills for their customers. They are considering which type of printer to use.

Tick the **four** most accurate statements regarding different types of printer, if used in the hotel reception area.

	✓
Laser printers produce very high quality output	
A dot matrix printer would produce higher quality output than an inkjet printer	
An inkjet printer would be slower at producing output than a dot matrix printer	
Dot matrix printers use continuous stationery	
Dot matrix printers need the ink cartridge changing more frequently than inkjet printers	
Dot matrix printers are very quiet which is important in a hotel reception area	
A laser printer can operate in harsh conditions, unlike a dot matrix printer	
A laser printer toner cartridge is more expensive to buy than an inkjet cartridge	
Multi-part stationery is easier to use with laser printers than with dot matrix printers	
Inkjet printers are cheaper to buy than dot matrix printers	

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Question	Answer		Marks
2	Laser printers produce very high quality output	✔	4
	A dot matrix printer would produce higher quality output than an inkjet printer		
	An inkjet printer would be slower at producing output than a dot matrix printer		
	Dot matrix printers use continuous stationery	✔	
	Dot matrix printers need the ink cartridge changed more frequently than inkjet printers		
	Dot matrix printers are very quiet which is important in a hotel reception area		
	A laser printer can operate in harsh conditions unlike a dot matrix printer		
	A laser printer toner cartridge is more expensive to buy than an inkjet cartridge	✔	
	Multi-part stationery is easier to use with laser printers than with dot matrix printers		
	Inkjet printers are cheaper to buy than dot matrix printers	✔	

6 Louis has partly typed up the notes from his IT lesson. He wants to complete these at home. Sophia, a fellow student, tells him that it may be difficult as he has been using proprietary software.

Explain what is meant by proprietary and open-source file formats, giving reasons why open-source file formats are needed.

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Question	Answer	Marks
6	Five from: Open source formats are often called free file formats if they are not covered by any copyrights/patents Open file formats can be used by both proprietary and open source software A proprietary file format has been created by a software company using a particular encoding scheme... ...designed by the company such that the decoding of this stored data is only easily done with software that the company itself has developed The specification of the data encoding format is usually kept secret It can be published but then its use is restricted through licences such that only the company itself/ users with licences may use it Open-source file formats are needed: Because not everyone can afford proprietary software When transferring data from one area to another as the computers being used may not have compatible software Archived proprietary files may be difficult to read by new software	5

7 An operating system is system software that manages computer hardware and software resources.

Describe the tasks that an operating system carries out.

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Question	Answer	Marks
7	Four from: Allocates memory to software Sends data/instructions to printers Responds to input devices Opens and closes files on storage devices In multi-tasking/multi-programming systems allocates equitable processing time to each task/program Sends error messages to applications/users Handles user logins Handles file permissions/security settings Provides the interface between the user and the computer	4

13 IT professionals often use command line interfaces (CLIs) to communicate with computers. Office workers, however, prefer graphical user interfaces (GUIs). In the home, gesture based interfaces (GBIs) are increasingly being used.

Evaluate these three types of interface.

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Question	Answer	Marks
13	Eight from: Users with physical handicaps may not be able to use a keyboard or mouse For reasons of hygiene a doctor may not be allowed to touch a display or device so need to use gesture based interface Appropriate gestures is a more hygienic way to control the device Gestures may be a quicker way of initiating a response from a device Certain gestures may not be socially acceptable which is not a problem with the other interfaces Some gestures may be unintentional but still initiate a reaction from the device GUIs tend to be more accurate than relying on gestures CLI requires user to have to learn many commands unlike the others CLI commands are more difficult to edit CLI is more difficult to view different items on one screen when multitasking CLI processing speed tends to be faster than the others CLI uses less memory than the others CLI is less likely to change over time whereas GUIs tend to change regularly meaning less need to learn how to use a new system One mark is available for an appropriate opinion	8

1　Tick the **four** most accurate statements regarding solid state drives (SSDs), hard disk drives (HDDs), magnetic tape drives and their associated media.

	✓
Hard disks are metal platters with a magnetic coating that stores data	
Hard disk drives have no moving parts and so are not at risk of being damaged	
Magnetic tape drives can have almost instantaneous data access	
SSDs have a faster data transfer rate than magnetic tape drives	
Magnetic tape uses direct access to search for data	
Magnetic tapes are used in laptop computers more than hard disks	
SSDs store considerably more data than magnetic tapes	
SSDs still cost more per gigabyte than hard disk drives	
SSDs make more noise than the sound of hard disk drives when in use	
Magnetic tapes are used to store backups of data on file servers	

[4]

Question	Answer		Marks
1	Hard disks are metal platters with a magnetic coating that stores data	✓	4
	Magnetic tape drives have moving parts and so are at risk of being damaged		
	Magnetic tape drives can have almost instantaneous data access		
	SSDs have a faster data transfer rate than magnetic tape drives	✓	
	Magnetic tape uses direct access to search for data		
	Magnetic tapes are used in laptop computers more than hard disks		
	SSDs store considerably more data than magnetic tapes		
	SSDs still cost more per gigabyte than hard disk drives	✓	
	SSDs make more noise than the sound of hard disk drives when in use		
	Magnetic tapes are used to store backups of data on file servers	✓	

5 A headteacher is updating the school's record-keeping system. For the new system he is considering using off-the-shelf software. When the new system is running the secretary will need to enter all the students' data. This will require accurate entry of the data.

(a) Define what is meant by the term 'software' and describe, giving examples of each, application and system software.

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(b) Describe the benefits of using off-the-shelf software.

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(c) Describe the drawbacks of using off-the-shelf software.

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(d) Describe the different methods of verification the secretary could use.

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Question	Answer	Marks
5(a)	**One** *mark:* It is a part of a computer system that consists of data or computer instructions **Three** *from:* System software is a type of computer program that is designed to run a computer's hardware and application programs Examples are utilities, operating systems, compilers, interpreters, assemblers, linkers and device drivers (must have two) Application software is a program or group of programs that is designed for the end user Examples are database programs, word processors, web browsers and spreadsheets (must have two).	4
5(b)	**Three** *from:* Software is cheaper as it is mass produced / do not have to employ programmers to write software for specific tasks It will be available straight away Testing has been rigorously carried out by the developers so there are unlikely to be any bugs There will be many sources of support Support includes helplines with operators who will already have had to deal with a wide range of problems.	3
5(c)	**Three** *from:* May be difficult to adapt to the particular use required by the school May have several distracting extra features unsuitable for the use it is to be put to May not necessarily be compatible with the existing system and software used Some functions peculiar to the school's needs may not be available.	3
5(d)	**Four** *from:* The secretary enters the data twice The computer stores the data on its hard disk / SSD and compares it with the data that is entered the second time … … generates an error message if the second entry does not match the first Alternatively two people type in the data The computer compares the two versions … … freezing the keyboard if there is a difference Comparing the data on the screen against the original paper document checking for mistakes Printing out a copy of the data and comparing the printout to the original paper document checking for mistakes.	4

2 Tick the **four** most accurate statements regarding internal hardware components.

	✓
A motherboard has a collection of chips and controllers known as the chipset	
A hard disk drive usually has less storage capacity than the RAM within a computer	
ROM is the memory used to store documents the user is currently working on	
The hard disk drive is used to store application software	
A solid state drive has no moving parts	
RAM is memory that cannot be changed	
A hard disk drive uses flash memory to store data	
RAM stores the start up instructions of a computer even when it is switched off	
A PC can still work without having a CPU	
The arithmetic logic unit and the control unit are part of the CPU in a computer	

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Question	Answer		Marks
2	A motherboard has a collection of chips and controllers known as the chipset	✔	4
	A hard disk drive usually has less storage capacity than the RAM within a computer		
	ROM is the memory used to store documents the user is currently working on		
	The hard disk drive is used to store application software	✔	
	A solid state drive has no moving parts	✔	
	RAM is memory that cannot be changed		
	A hard disk drive uses flash memory to store data		
	RAM stores the start up instructions of a computer even when it is switched off		
	A PC can still work without having a CPU		
	The arithmetic logic unit and the control unit are part of the CPU in a computer	✔	

3 A hockey club secretary is planning to computerise the players' records. For this system she is considering using custom written software.

(a) Describe the drawbacks of using custom written software.

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(b) Describe the benefits of using custom written software.

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Question	Answer	Marks
3(a)	**Three** from: Costs more to pay programmers to write code specifically for the task/users' needs/don't share development costs with other users Testing is limited to what the programmers think may be required ... ... based on how they think the software will be used Support is limited to the team of programmers only Can take a long time to develop the software There may be a lot of bugs as it has not been tested <u>so thoroughly</u>/has not been used before	3
3(b)	**Three** from: It is designed specifically for the task/customers' requirements There will be no unnecessary features It does not have to be adapted for use Programmers are available to make any changes required/rectify bugs Programmers will ensure that it is compatible with the existing system and software	3

7 Sadiq has written a program that he now wishes to convert using a compiler.

(a) There are two types of software. Name them, indicating which type a compiler is.

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(b) Describe the function of a compiler.

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Question	Answer	Marks
7(a)	Application and system (software), compiler is system	1
7(b)	**Four** from: A compiler is a computer program/set of programs It translates source code/program written in a high level programming language It translates source code/program into a lower level language/assembly language/machine code/object code It creates an executable program It translates it for the <u>computer which can only understand machine code</u> to run It produces error messages/list of errors to help programmer debug the program	4

11 Juanita, an office manager, has just been given the task of producing customer invoices. Each invoice will need to have three copies. She is trying to decide between using a dot matrix printer or an inkjet printer to produce the invoices.

(a) Give **three** detailed advantages of Juanita choosing a dot matrix printer.

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(b) Give **three** detailed disadvantages of Juanita choosing a dot matrix printer.

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Question	Answer	Marks
11(a)	**Three** from: She could use carbon copy paper (which requires less filling of the sheet feeder) She could use continuous stationery which would require less human interaction/doesn't run out of paper as quickly as inkjet The ink ribbon lasts longer/cheaper to buy than an inkjet cartridge, saving costs When the ink runs out on an inkjet printout is less legible, whereas with a dot matrix printer the print gets fainter but is still legible	3

Question	Answer	Marks
11(b)	**Three** from: The striking of the heads causes a lot of noise which would be distracting in an office environment The quality of output is not so good with a maximum of 240 dpi whereas inkjets output at 1200 dpi The speed of output is not as high as an inkjet printer, with the fastest dot matrix only approaching the speed of the slowest inkjet The cost of a dot matrix printer <u>to buy</u> is far more expensive than a typical inkjet Dot matrix has a more limited character set.	3

3 Most computer systems consist of hardware and software.

(a) Define the term 'hardware' in an IT context.

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(b) Giving brief descriptions of **two** examples, define the term utility software.

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Question	Answer	Marks
3(a)	The collection of physical components/devices that constitute/are used in a computer system	1

Question	Answer	Marks
3(b)	**Two** from: A program that helps perform maintenance in a computer system A program that performs a very specific task usually related to managing system resources Operating systems can contain a number of utilities for managing files and storage devices **Two** from: Examples are: anti-virus software to remove viruses back-up software to make copies for future use data compression utilities to reduce the storage size of a file disk defragmentation utilities to remove non-contiguous spaces on a disk disk formatting is preparing a data storage device for initial use file-copying utilities for the creation of a new file which has the same content as an existing file deleting files, which is removing a file from a computer's file system	4

3 Pardeep has a lot of confidential data on her desktop computer which she wishes to transfer to a backing storage device. She is not sure whether to buy an extra hard disk drive or a magnetic tape drive.

Evaluate, by weighing up the advantages and disadvantages, the use of a hard disk drive compared with a magnetic tape drive.

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Question	Answer	Marks
3	Evaluation based on: **Advantages** HDDs have faster data access speed than magnetic tape drives Quicker to make single file retrievals from backups / selective backups with HDD than magnetic tape drives Tapes are more likely to go missing as they are more portable HDDs are cheaper to buy than magnetic tape drives **Disadvantages** Once the data is found, magnetic tape drives have quicker data transfer rate than HDDs when reading data HDDs tend to have shorter longevity compared to magnetic tape drives HDDs have less storage capacity than magnetic tape drives When further memory is required subsequently, it is more expensive to buy another HDD than to buy a new tape HDDs are more prone to mechanical failure than magnetic tape drives HDDs have higher power consumption than magnetic tape drives **Must have at least one of each to gain full marks**	6

4 By describing RAM and ROM, explain why a computer needs both types of memory.

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Question	Answer	Marks
4	**Eight** from: RAM stands for Random Access Memory and ROM stands for Read Only Memory RAM stores information for relatively short term/temporary usage by the processors/CPU and other components such as the VGA RAM is used by computers for storing data during computing processes RAM is a volatile memory/data are destroyed once the power to the device is stopped RAM stores active program data Large RAM chips can be read faster than most ROMs… … so ROM content is sometimes copied to RAM and subsequently read from RAM ROM cannot be changed/erased by a program/user/easily/can only be read from RAM can be read from and written to RAM is needed to store data that the user is currently working on ROM is non-volatile memory/ROM retains its data even after the computer is turned off/ROM is needed to store the instructions for the computer to start up (when it is turned on again)/ permanent computer instructions ROM is used to store software that is unlikely to need frequent updates ROM is needed to store boot up instructions to activate hard disk drive/BIOS	8

6 Many people have computers and devices in the home and in their cars that can be controlled using a gesture based interface or a dialogue interface.

Evaluate, by weighing up the advantages and disadvantages, these two user interfaces when compared to each other.

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Question	Answer	Marks
6	**Eight** from: Advantages of gesture-based/disadvantages of dialogue based Gestures may be a quicker way of initiating a response from a device People who have a speech impediment may find a dialogue interface too difficult to use/can find a gesture based interface useful Dialogue interface may not operate reliably/gestures will still be reliable if there is (background) noise or user has a cold/strong dialect/accent Dialogue interface often requires a training session with the user/gestures can be taught through manuals Disadvantages of gesture-based/advantages of dialogue based Users with physical disabilities may not be able to make gestures/may find dialogue interfaces easier to use Users with physical disabilities in their limbs could still speak into a microphone to control a device Certain gestures may not be socially acceptable/user could feel uncomfortable making gestures while driving/in front of others, which is not a problem with a dialogue interface Some gestures may be unintentional but still initiate a reaction from the device Dialogue interface allows hands free control, ensuring safety when driving Gestures would need at least one hand to leave the steering wheel Gesture based is less effective when several users/background movement involved Gesture based interface requires line of sight unlike dialogue interface **One from each section is needed to gain full marks**	8

2 **(a)** Tick the most accurate statement referring to the use of compilers and interpreters.

	✓
An interpreter creates a single executable file that runs directly on the CPU	
It is easier to debug compiled code rather than interpreted code	
With a compiler it is harder to protect intellectual property as machine code is easy to understand	
It is more difficult for hackers to modify compiled code	

[1]

(b) Tick the most accurate statement referring to the use of disk formatting.

	✓
Disk formatting increases the number of fragments in a hard disk	
Disk formatting never removes viruses from a hard disk	
Disk formatting increases the storage capacity of a blank disk	
Disk formatting is used to fully prepare a hard disk for initial use	

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Question	Answer		Marks
2(a)	An interpreter creates a single executable file that runs directly on the CPU		1
	It is easier to debug compiled code rather than interpreted code		
	With a compiler it is harder to protect intellectual property as machine code is easy to understand		
	It is more difficult for hackers to modify compiled code	✓	
2(b)	Disk formatting increases the number of fragments in a hard disk		1
	Disk formatting never removes viruses from a hard disk		
	Disk formatting increases the storage capacity of a blank disk		
	Disk formatting is used to fully prepare a hard disk for initial use	✓	

8 Explain how encryption protects data stored on a hard disk.

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Question	Answer	Marks
8	**Five** from: Can be either through use of symmetric or asymmetric encryption. Can be through the use of public and private keys. Causes data to be scrambled/encoded. Requires an encryption key to encrypt. Requires a decryption key to decrypt. Results in data which is not understandable/readable/protects sensitive data from being understood if it falls in to the wrong hands.	5

11 Mary has been put in charge of the computerised school weather station. At the moment the system has a monitor to show the outputs. She wants to replace the monitor with a printer.

By weighing up the advantages and disadvantages, evaluate the system having a monitor rather than a printer.

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Question	Answer	Marks
11	**Six** from: Advantages: Will not have to spend money on buying a printer. Results are produced (almost) instantly. Graphs tend to more accurately represented. Easier to scroll through a table of results than look through several printouts. Disadvantages: Difficult to compare graphs of results day by day. It is often easier to print off results and use a pen to annotate the results than using software. Printouts are transportable and can be viewed anywhere. May skim over on-screen results, increasing the chance of errors being overlooked/on paper text is more likely to be read thoroughly.	6

9 Check-out terminals in supermarkets have a number of different input devices for entering data about products and for payment purposes.

Analyse the use of these input devices in the supermarket.

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Question	Answer	Marks
9	**Eight** from Bar code reader is used to read bar codes from the products. Number pad would be used to input the bar code if the bar code was damaged and could not be read by bar code reader. Number pad would be used in conjunction with bar code reader for entering the number of items with that bar code. Entering number on number pad would be quicker than scanning several identical bar codes. Chip and PIN reader to read details from customer's bank card. Contactless card reader to read details from customer's bank card. Chip and PIN reader more secure than contactless reader. In many countries contactless method is only allowed for transactions less than a certain amount. Chip and PIN is more reliable than reading magnetic stripe. Chip and PIN is quicker than typing in details from the card. Contactless card readers speed up transactions as no PIN is required.	8

12 A headteacher wishes to buy software which will help him manage the finances of the school. When considering which software to buy he has to choose between custom written software and off-the-shelf software.

Describe the differences between these two types of software.

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Question	Answer	Marks
12	**Six** from: Custom written software is specially developed for a specific company/business. Custom written software is written to accommodate that customer's particular preferences and needs/off the shelf software has to be adapted to fit the business that has purchased it. Off-the-shelf software may have several unnecessary features that the company may not need/custom written software has only the features the user needs. Custom written software is written by programmers to solve specific problems. Custom written software is owned by the business that commissions it/off the shelf software means the business only has a licence. Off-the-shelf software is ready-written/ready for use and already exists/ there is often a delay between commissioning and receipt of custom written software. Off-the-shelf software is available to all businesses and companies/general public not just a specific company/business. Custom written software means that support is available directly from creators/off-the-shelf usually provide call centres which may not be able to solve problems specific to the business.	6

7 A program written in a simple high level programming language has a mistake in it.

Line 20 should say LET A = X + Y, but the program was typed as:

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10  INPUT X, Y
20  LE A = X + Y
30  PRINT X, " + ",Y, " = ", A
40  END
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Describe the **two** ways the program, including the error, could be translated so that it runs on a computer.

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Question	Answer	Marks
7	**Six** from: It could be translated using a compiler or interpreter *Compiler – four max.* Would translate the whole program as one complete unit. Would create an executable file. Would report on the error in line 20 after compilation. Would not run the program until error is corrected and whole program retranslated. *Interpreter – four max.* Would translate each line of the program into an intermediate stage and then execute that line/statement. Would report on the error in line 20 on execution. Would wait for error to be corrected before executing that line. Would then continue from line 20 to line 40.	6

13 Pramana has a PC which has a fixed hard disk drive. In order to increase the storage capacity of the computer, he is trying to choose between using a portable hard disk drive and storing his data in the cloud.

By weighing up the advantages and disadvantages, evaluate the use of cloud storage compared to using a portable hard disk drive.

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Question	Answer	Marks
13	**Six from:** *Advantages of the cloud* The initial cost of an external hard disk drives can be more expensive than paying a low monthly fee for the cloud. Cloud storage has no physical presence/it does not take up valuable space at home or in the office. Cloud storage services back up data automatically after initially being instructed. Do not need to transport hard disk drive with you if you want to transfer data to another computer/device. Syncing ensures files are automatically updated across all devices owned by an individual. *Disadvantages of the cloud* Data will be in the hands of a third-party so security measures may be less than required. Cloud service providers can be transient, resulting in possible loss of data. Cloud storage is only as reliable as the user's internet connection. Some cloud service providers charge a cheap fee initially but then raise prices later. Users are at risk of not having their data stored in compliance with government regulations if the physical storage location resides in a different country. **Must have at least one of each to gain full marks**	6

1 **(a)** Tick the most accurate statement regarding input devices.

	✓
A touch screen is easier to use than a keyboard for inputting large amounts of text	
Using a keyboard is the most efficient method of moving a file from one folder to another	
A scanner is an input device used for inputting hard copy documents	
A motor is an input device used for inputting physical variables in a control system	

[1]

(b) Tick the most accurate statement regarding output devices.

	✓
A sensor is an output device used as an actuator in a control system	
A dot matrix printer is the quickest printer for outputting large amounts of text	
A webcam is an output device used to display moving images	
An inkjet printer can be used to output high-quality photographs	

[1]

(c) Hard disk drives, magnetic tape drives and solid-state drives (SSD) are often referred to as secondary storage devices whereas RAM and ROM are often referred to as primary storage devices.

Explain why computers need secondary storage devices.

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Question	Answer	Marks
1(a)		1

A touch screen is easier to use than a keyboard for inputting large amounts of text	
Using a keyboard is the most efficient method of moving a file from one folder to another	
A scanner is an input device used for inputting hard copy documents	✓
A motor is an input device used for inputting physical variables in a control system	

Question	Answer	Marks
1(b)		1

A sensor is an output device used as an actuator in a control system	
A dot matrix printer is the quickest printer for outputting large amounts of text	
A webcam is an output device used to display moving images	
An inkjet printer can be used to output high quality photographs	✓

Question	Answer	Marks
1(c)	**Four** from: Secondary storage devices store data permanently whereas RAM is volatile Users' data is lost from RAM when the computer is switched off Backups/second copies of data are often needed in case anything happens to the original and this is impossible in RAM RAM/ROM is far more expensive than secondary storage per unit of storage RAM/ROM has limited memory/can be difficult to upgrade so disks are needed to load large amounts of data ROM/RAM store the start-up instructions before secondary storage becomes usable Disks/secondary storage devices are needed to store operating systems/applications	4

2 **(a)** Tick the statement which most accurately refers to the results of using utility software.

	✓
Lossless compression reduces the number of bits by increasing redundant data	
Some information is lost in lossless compression	
Lossy compression reduces the number of bits by identifying unnecessary information and removing it	
Disk defragmentation organises the contents of the disk into the largest number of contiguous regions	

[1]

(b) Tick the statement which most accurately refers to the properties of a hard disk.

	✓
Data access is faster on a hard disk with fragmented files than on a defragmented hard disk	
Disk formatting prepares a data storage device for initial use	
The first stage of formatting is high-level formatting followed by low-level formatting	
Disk partitioning makes the data storage device invisible to an operating system	

[1]

(c) A type of utility software enables files to be deleted.

Explain how the delete utility works and how files can be recovered even after they appear to have been deleted.

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Question	Answer		Marks
2(a)	Lossless compression reduces the number of bits by increasing redundant data		1
	Some information is lost in lossless compression		
	Lossy compression reduces the number of bits by identifying unnecessary information and removing it	✓	
	Disk defragmentation organises the contents of the disk into the largest number of contiguous regions		

Question	Answer		Marks
2(b)	Data access is faster on a hard disk with fragmented files than on a defragmented hard disk		1
	Disk formatting prepares a data storage device for initial use	✓	
	The first stage of formatting is high-level formatting followed by low-level formatting		
	Disk partitioning makes the data storage device invisible to an operating system		
2(c)	**Four** from: **Three max** from: Most operating systems keep track of where files are on a hard disk through pointers Each file and folder on a hard disk has a pointer that tells the operating system where the file's data begins and ends/its length When a file is deleted the operating system removes the pointer and marks the sectors containing the file's data as available The file is no longer present on the hard disk as the sectors containing its data are considered free space Uses a file allocation table (FAT) to store the location of files on the disk The delete utility just deletes the reference of the index in the FAT. **Two max** from: Until the operating system writes new data over these sectors the file is still recoverable A file recovery program can scan a hard drive for deleted files and restore them If the file has been partially overwritten, the file recovery program can only recover part of the data A file recovery program works by reinstating pointers/reinstating the index in the FAT as long as it is done before any data is overwritten.		4

6 DVDs and blu-ray discs are optical media which store data and can be used by computers.

Evaluate, by weighing up the advantages and disadvantages, the use of blu-ray discs compared to DVDs for storing computer data.

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Question	Answer	Marks
6	**Six** from: A single Blu-ray disc stores more data than a single DVD Blu-ray stores up to 128 GB against 8.7GB max Blu ray disc drives are more expensive to buy than DVD drives Blu-ray discs cost less to buy per unit memory Blu-ray drives can read DVD DVD drives cannot read Blu-ray discs A single Blu-ray disc costs more to buy than a single DVD Blu-ray discs can store higher quality videos than DVDs	6

8   Describe the differences between a compiler and an interpreter.

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Question	Answer	Marks
8	**Six** from: A compiler converts the high-level instructions into machine language/object/code/executable code <u>all at once</u> An interpreter converts the high-level instruction into some intermediate form and after that the instruction is executed The entire program is compiled before being executed The interpreter translates one statement at a time, executing the statement before moving on to the next one A list of errors is created by the compiler after the compilation process An interpreter stops translating after the first error/reports an error immediately on encountering it The compiled program is executed directly using the machine code An interpreter does not convert the source code to an object code file before execution Interpreted programs can be modified at runtime by adding/changing functions A compiled program has to be recompiled fully even for small modifications to be made	6

7 Describe the roles of a compiler and a linker and explain why both might be necessary in the conversion of a high-level language program.

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Question	Answer	Marks
7	**Six** from: *Compiler* – **four max** from: Translates the whole program as one complete unit/at once Translates the program into machine code Creates an executable file Produces a report of errors in the code after compilation Can optimise source code to run as fast or as efficiently as possible *Linker* – **two max** from: A linker takes one or more object files and combines them… …into a <u>single</u> executable file Replaces symbolic addresses with real addresses **Five max from compiler and linker sections** *Both needed* – **two max** from: Many programming languages allow the writing of different pieces of code/modules separately Programming tasks are simplified as large programs can be broken into smaller, more manageable pieces… …the linker is used to put all the modules together Without the compiler the linker would have no object files to combine At least one point from **each section** must be made to gain full marks	6

10 There are several different generic file formats which can be used to save data.

Evaluate, by weighing up the advantages and disadvantages, the use of txt format to save data.

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Question	Answer	Marks
10	**Six** from: **Advantages** File size is small so takes up little storage space As the file size is smaller the processing time is quite short Can be opened by more applications than if saved in a specific file format Data can be exchanged between different kinds of applications Data can be exchanged between different computers and operating systems It is human readable and easy to edit manually **Disadvantages** There is no distinction between text and numeric values Documents must be reformatted/lose formatting Can't embed images/graphics/videos Cannot have tables Resulting layout may make it difficult to read Must have at least one from each for full marks	6

2020 Nov 12 - 12

12 When a person buys a PC it comes with a variety of hardware and software.

(a) Define the term software.

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(b) Explain why the two types of software are needed by a PC user.

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Question	Answer	Marks
12(a)	**Two** from: The programs used to direct the operation of a computer and related hardware/to allow communication between computer and hardware Two types of software, application software and system software Application software uses the computer system to perform specific tasks System software manages computer hardware	2
12(b)	**Six** from: Without system software a computer cannot work/system software performs core functions of the computer Application software are programs that people use to carry out specific tasks on a computer Examples of application software are word processors, spreadsheets and databases (must have at least two) Before they can use applications users require a computer to have system software System software coordinates the activities and functions of hardware and software System software controls the operations of computer hardware Examples of system software are operating system /compilers /interpreters /linkers /device drivers /utilities (must have at least two) Operating systems act as an interface with application programs System software can run independently of application software Application software can't run without the presence of system software System software makes data transfer possible between the memory and disks and manages the output to display devices Application software makes use of system software to save and load documents Application software makes use of system software to print documents System software is needed to control security	6

1 There are many internal hardware devices in a typical personal computer.

(a) Tick the most accurate statement referring to hardware.

	✓
There are two types of hardware: application hardware and system hardware.	
Hardware consists of the programs used to direct the operation of a computer.	
Hardware is the collection of physical components that constitute a computer system.	
A device driver is an example of an item of hardware.	

[1]

(b) RAM is an example of an item of internal hardware.

Tick the most accurate statement referring to RAM.

	✓
A hard disk drive allows quicker access to data than RAM.	
RAM is portable and very easy to move from device to device.	
RAM stores active program data.	
Per unit of memory, RAM is far cheaper to buy than a hard disk drive.	

[1]

(c) (i) Describe the components of the central processing unit and describe their function.

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(ii) A computer contains a number of internal hardware components.

Describe the following:

Motherboard ....

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Sound card ....

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[4]

Question	Answer		Marks
1(a)	There are two types of hardware: application hardware and system hardware.		1
	Hardware consists of the programs used to direct the operation of a computer.		
	Hardware is the collection of physical components that constitute a computer system.	✔	
	A device driver is an example of an item of hardware.		
1(b)	A hard disk drive allows quicker access to data than RAM.		1
	RAM is portable and very easy to move from device to device.		
	RAM stores active program data.	✔	
	Per unit of memory, RAM is far cheaper to buy than a hard disk drive.		

1(c)(i)	**Four** from:	4
	Max **two** from:	
	Comprises memory, control unit and arithmetic logic unit (must have at least two)	
	Tends to be contained on an integrated circuit chip called a microprocessor	
	Max **three** from:	
	Control unit retrieves/fetches instructions from the computer's main memory…	
	…interprets/decodes instructions…	
	…carries out/executes instructions	
	All input data are transferred via CPU's memory/registers	
	Memory/registers store instructions as well as data	
	Data is stored in the CPU memory whilst a calculation or instruction is being carried out.	
	Input data are transferred to the arithmetic and logic unit for processing	
	ALU: Arithmetic unit makes use of the four basic arithmetic functions (i.e., addition, subtraction, multiplication, and division)	
	ALU: Logic unit uses certain logic operations such as comparisons, selections and matching	

Question	Answer	Marks
1(c)(ii)	*Motherboard* – **two** from:	4
	The main printed circuit board of a computer	
	Connects the main components of a computer	
	Contains mass storage interfaces	
	Contains serial and parallel ports	
	Contains USB ports	
	Contains network port	
	Contains <u>expansion</u> slots	
	Contains controllers required to control standard peripheral devices	
	Contains the connectors for attaching additional boards	
	Contains the BIOS chip/chipset	
	Contains means of plugging in/socket for CPU	
	Contains RAM slots	
	Sound card – **two** from:	
	An expansion board that enables a computer to manipulate and output audio	
	Enables the computer to output sound through speakers connected to the board	
	Enables the computer to receive sound input from a microphone	
	Enables the computer to manipulate sound stored on a disk	
	Nearly all sound cards support MIDI, a standard for representing music electronically	

2 **(a)** Tick the most accurate statement referring to a gesture-based interface.

	✓
It is easier for users with physical disabilities to use a keyboard or mouse than make gestures.	
It is easier to enter text with a gesture-based interface than with a command line interface.	
Gestures are more accurately interpreted than mouse clicks.	
Some gestures may be unintentional but still initiate a reaction from the device.	

[1]

(b) Tick the most accurate statement referring to a dialogue interface.

	✓
Dialogue interfaces are more difficult to use than command line interfaces.	
A dialogue interface uses less memory than a command line interface.	
A dialogue interface may not operate reliably if there is background noise.	
Dialogue interfaces have unlimited vocabularies.	

[1]

(c) Many software developers use a command line interface (CLI).

Evaluate, by weighing up the advantages and disadvantages, a CLI compared to a graphical user interface (GUI).

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Question	Answer	Marks
2(a)	<table><tr><td>It is easier for users with physical disabilities to use a keyboard or mouse than make gestures.</td><td></td></tr><tr><td>It is easier to enter text with a gesture-based interface than with a command line interface.</td><td></td></tr><tr><td>Gestures are more accurately interpreted than mouse clicks.</td><td></td></tr><tr><td>Some gestures may be unintentional but still initiate a reaction from the device.</td><td>✔</td></tr></table>	1
2(b)	<table><tr><td>Dialogue interfaces are more difficult to use than command line interfaces.</td><td></td></tr><tr><td>A dialogue interface uses less memory than a command line interface.</td><td></td></tr><tr><td>A dialogue interface may not operate reliably if there is background noise.</td><td>✔</td></tr><tr><td>Dialogue interfaces have unlimited vocabularies.</td><td></td></tr></table>	1

Question	Answer	Marks
2(c)	**Eight** from: Advantages With a CLI the processing speed tends to be faster than GUI A CLI uses less memory/resource… …as it doesn't need to store WIMP features CLI doesn't require graphics software or a high-resolution monitor CLI is less likely to change over time whereas GUIs tend to change regularly, meaning less need to learn how to use a new system CLI users only need to utilise a keyboard to navigate the interface, often resulting in faster performance Taking a hand off the keyboard to move the mouse is slower than using a CLI for many users Disadvantages CLI requires the user to have to learn many commands unlike GUI CLI commands can be slower to input particularly for inexperienced users… …long lines of text need to be entered rather than a few clicks of a mouse CLI commands are more difficult to edit With a CLI it is more difficult to view different items on one screen when multitasking A CLI is often very basic and can be more of a strain on a user's vision More likely to make mistakes typing commands **At least two of each required to obtain full marks** **Must be a proper evaluation to obtain full marks** **Max. six marks if bullets/list of points** **Must have expansions or direct comparisons to be a proper evaluation**	8

5 Joan has written some gaming software in a high-level programming language. She intends to publish and sell copies of the game. She wants to test it on her computer. The software will be converted into a lower-level language.

Evaluate, by weighing up the advantages and disadvantages, the use of a compiler for this purpose.

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Question	Answer	Marks
5	**Seven** from: Advantages Once the program is already compiled into machine language, there is no translation software that the user has to keep up to date Compiled software can run faster than interpreted software Compiling a program is a much quicker process than interpreting Compilers also improve security for programmers… …by making it much harder to copy Joan's code Disadvantages Can only be used on one operating system… …Joan's target audience will have different computers and operating systems… … Will need to use an interpreter if she wishes to share the software It is slow/more difficult to debug the program… …the whole program needs to be compiled again after an error is corrected It uses up more memory than an interpreter… …as the whole program has to be loaded Once compiled, any changes to the original high-level code will require the program to be compiled again **At least one of each required to obtain full marks** **Must be a proper evaluation to obtain full marks** **Max. five marks if bullets/list of points** **Must have expansions or direct comparisons to be a proper evaluation**	7

11 Explain, using examples, what is meant by the term generic file format.

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Question	Answer	Marks
11	**Three** from: A generic file format is one which will be recognisable to most software packages If a software package does not recognise a particular file format it will be unable to load it Generic file formats are .txt, .csv, file types (allow any two correct examples) Max **one** for an expansion e.g. .txt can be loaded by most word processing software .csv can be loaded by most spreadsheet software	3

12 Joanne has created a spreadsheet using proprietary software. Paula has suggested that she should save it in an open-source file format.

(a) Describe **three** distinct features of proprietary software.

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(b) Describe **two** distinct features of an open-source file format.

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Question	Answer	Marks
12(a)	**Three** from: Proprietary software is software that is owned by an individual or a company, usually the one that developed it There are almost always major restrictions on its use A software vendor delineates the specific terms of use in an end-user license agreement Its source code is almost always kept secret Usually covered by copyright, which provides a legal basis for its owner to establish exclusive rights	3
12(b)	**Two** from: Can be used and implemented/accessed by anyone An open-source file format can be used by both proprietary and open-source software Anyone may use them at no monetary cost for any desired purpose They can be opened by most types of software There is a published specification for storing digital data, usually maintained by a standards organisation	2

2 Many computer users use a hard disk drive to store their data and use the cloud to back up this data.

(a) Tick the most accurate statement referring to the cloud.

	✓
It is a cheaper method than any other form of storage.	
Data is more secure than when stored using any other form of storage.	
Users have an unlimited amount of free storage.	
You can store data wherever you are, as long as there is an internet connection.	

[1]

(b) Tick the most accurate statement referring to a hard disk drive.

	✓
It is an optical method of storage.	
It can be used to store operating systems.	
It cannot store movies.	
It does not consist of moving parts.	

[1]

(c) Evaluate, by weighing up the advantages and disadvantages, the use of a magnetic tape drive compared to the use of an external solid-state drive (SSD) for making backups.

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Question	Answer		Marks
2(a)	It is a cheaper method than any other form of storage.		1
	Data is more secure than when stored than any other form of storage.		
	Users have an unlimited amount of free storage.		
	You can store data wherever you are, as long as there is an internet connection.	✓	

2(b)	It is an optical method of storage.		1
	It can be used to store operating systems.	✓	
	It cannot store movies.		
	It does not consist of moving parts.		

Question	Answer	Marks
2(c)	**Six** from: *Advantages* The cost of storage per GB in the long term is cheaper with a magnetic tape drive than with an SSD drive The cost of a tape cartridge is much cheaper than the same size SSD Tape cartridges can store more than an external SSD drive Magnetic tape has a longer lifespan… … The NAND flash used in SSDs can only be used for a finite number of writes It is more difficult to hack into a magnetic tape drive than an external SSD drive Tape storage density is growing faster than SSD drives *Disadvantages* The cost of a tape drive is initially more expensive than an SSD drive If the data is stored near a strong magnetic field or a large speaker, the tape can be damaged. It is necessary to keep older tape equipment just to be able to read the stored data Access to data on a magnetic tape drive is slower as data is stored sequentially… …to get to the data needed, it is necessary to start at the beginning of the tape and read all the preceding data prior to reaching the required data… … whereas all parts of the SSD can be accessed at once If huge amounts of data are stored, different cartridges may need to be loaded, which takes time Tape drives are more susceptible to shock and damage… …as there are moving parts SSDs use significantly less power than tape drives With no moving parts, SSDs run at near silent operation unlike tape drives **At least one of each required to obtain full marks** **Must be a proper evaluation to obtain full marks** **Max. five marks if bullets/list of points** **Must have expansions or direct comparisons to be a proper evaluation**	6

3   Explain how the following tasks are carried out using utility software:

   (a) data compression

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   (b) disk formatting

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   (c) file deletion.

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Question	Answer	Marks
3(a)	**Three** from: Data compression reduces the overall number of bits and bytes in a file A lot of data in computer files is redundant, with the same information listed over and over again File compression programs remove the redundancy A lossless file compression program uses codes to represent repeated information When decompressed, the codes are replaced with the original text Compression can be either lossless or lossy, where repeated parts are deleted	3

Question	Answer	Marks
3(b)	**Three** from: Low-level formatting divides the disk surface into tracks, sectors and cylinders This is done by magnetising the disk areas using the write heads Tracks are numbered starting from 0 When the head goes from one track to the next, it leaves a gap Each track is organised into numbered sectors, starting at 1 and separated by gaps The purpose of low-level formatting is to prepare the disk surface to receive data/allow the user to save data/files High-level formatting creates a file system on the disk This allows the operating system to use the disk space to store and access files	3
3(c)	**Three** from: Deleting a file consists of removing the file name and address from a table which stores data about the file The space on the disk where the file was located is now available for future use by other files Moving a file to trash/recycle bin simply alters the directory path to indicate that the file has been temporarily deleted It is only deleted in as much as the software shows it in the trash can/recycle bin rather than in a normal folder Only when the file is deleted from the trash/recycle bin is the file removed from the table and the file's disk space is marked as available for reuse	3

2 **(a)** Tick the most accurate statement referring to the purpose of input devices.

	✓
A sensor is used to store data for later use.	
A magnetic chip reader is used to enter text directly from a bank card.	
A bar code reader is used to read magnetic ink characters.	
A touchpad is used to simulate the behaviour of a mouse when using a laptop computer.	

[1]

(b) Tick the most accurate statement referring to the purpose of output devices.

	✓
A laser printer can only be used to output low volumes of high-quality documents.	
A dot matrix printer can use continuous stationery.	
A plotter is used to output multi-part stationery.	
An inkjet printer is used to output high volumes of low-quality documents.	

[1]

Question	Answer		Marks
2(a)	A sensor is used to store data for later use.		1
	A magnetic chip reader is used to enter text directly from a bank card.		
	A bar code reader is used to read magnetic ink characters.		
	A touchpad is used to simulate the behaviour of a mouse when using a laptop computer.	✓	

Question	Answer		Marks
2(b)	A laser printer can only be used to output low volumes of high-quality documents		1
	A dot matrix printer can use continuous stationery	✓	
	A plotter is used to output multi-part stationery		
	An inkjet printer is used to output high volumes of low-quality documents		

4 Describe the differences between system software and application software. Include features and examples of each type of software in your answer.

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Question	Answer	Marks
4	**Six** from: System software acts as an interface between application software and hardware of the computer Application software acts as an interface between user and system software System software is designed to manage the system resources and provides a platform for application software to run Application software is designed for the users to perform their specific tasks System software takes care of memory management/protection/security of the system System software starts running when the system is turned on, and runs till the system is shut down Application software runs as and when the user requests A system is unable to run without system software Application software is not required to run the system; it is user specific and is designed to meet the requirements of the user System software is general purpose whereas application software has a specific purpose System software examples: operating systems, utilities, compilers, interpreters, linkers, device drivers (must have at least two) Application software examples: spreadsheets, databases, word processing, animation software, video editing software etc. (must have at least two) **Must have gained mark for examples of application and mark for system software to gain full marks** **Must have features of both to gain full marks**	6

5   A company owner wishes to buy software to use to produce advertising materials for her company. She can either buy custom written software or off-the-shelf software.

(a)   Describe **three** benefits of using custom written software.

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(b)   Describe **three** benefits of using off-the-shelf software.

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Question	Answer	Marks
5(a)	**Three** from: It is designed specifically for the task There will be no unnecessary features It does not have to be adapted for use Programmers are available to make any required modifications to the software Programmers will ensure that it is compatible with the existing system and software	3

Question	Answer	Marks
5(b)	**Three** from: Software is cheaper to buy as it is mass produced It will be available straight away Testing has been rigorously carried out by the developers so there are unlikely to be any bugs There will be many sources of support ... ... including helplines with operators who will already have had to deal with a wide range of problems	3

1 A printer driver is a type of device driver.

(a) Tick the most accurate statement regarding printer drivers.

	✓
They are used to control the hard disk drive.	
They handle the translation of requests between the computer and the printer.	
One printer driver can control any printer.	
They ensure that there are no paper jams.	

[1]

(b) Tick the most accurate statement regarding device drivers in general.

	✓
One device driver works with every operating system.	
Device drivers are extra hardware inside the device.	
Upon installation, a device driver detects and identifies the peripheral device.	
A device driver is needed to control the central processing unit of a computer.	

[1]

(c) Explain the purpose of an operating system.

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Question	Answer		Marks
1(a)	They are used to control the hard disk drive.		1
	They handle the translation of requests between the computer and the printer.	✓	
	One printer driver can control any printer.		
	They ensure that there are no paper jams.		
1(b)	One device driver works with every operating system.		1
	Device drivers are extra hardware inside the device.		
	Upon installation, a device driver detects and identifies the peripheral device.	✓	
	A device driver is needed to control the central processing unit of a computer.		
1(c)	**Six** from: It runs other programs and applications It manages hardware resources It recognises input from a keyboard/mouse It sends output to a display screen/device It manages files and directories It allocates memory to software A multi-user OS is when two or more users can run programs at the same time A multiprocessing OS is when the system has more than one processor A multitasking OS allows more than one program to run at the same time A multitasking OS allocates sufficient processor time to each program Multithreading OS allows different parts of a single program to run at the same time Real time OS allows the computer to respond to input instantaneously Distributed OS allows data to be stored on a number of computers in different locations It is responsible for handling errors		6

2 A user interface is the method by which a user and a computer exchange information and instructions.

(a) Tick the most accurate statement referring to the use of colour in a user interface for users who suffer from colour blindness (colour vision deficiency).

	✓
It is good practice to use complementary colours such as red text on a green background.	
It is good practice to use text in small sizes and weights to emphasise it against a different-coloured background.	
It is good practice to always use as many colours as possible when designing an interface.	
It is good practice to use a soft-coloured background such as grey or cream to allow text of a different colour to be read more easily.	

[1]

(b) Tick the most accurate statement referring to elements of a user interface.

	✓
Radio buttons only allow you to select one option from a list.	
A text box does not allow you to type numbers into it.	
Text should use the same font size whether the information is important or less important.	
It is a good idea to have a different font size for each word in a title.	

[1]

(c) A developer has been asked to produce software. The software will allow a company's employees to enter data. The user interface will be a graphical user interface (GUI) and must be easy to use.

Describe **four** features of the layout of such a user interface.

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Question	Answer		Marks
2(a)	It is good practice to use complementary colours such as red text on a green background.		1
	It is good practice to use text in small sizes and weights to emphasise it against a different-coloured background.		
	It is good practice to always use as many colours as possible when designing an interface.		
	It is good practice to use a soft-coloured background such as grey or cream to allow text of a different colour to be read more easily.	✔	
2(b)	Radio buttons only allow you to select one option from a list.	✔	1
	A text box does not allow you to type numbers into it.		
	Text should use the same font size whether the information is important or less important.		
	It is a good idea to have a different font size for each word in a title.		
2(c)	**Four** from: Sensible use of white space Information that needs attending to immediately should always be displayed in a prominent position A consistent use of screens/use similar sized/positioned icons/buttons Must not overload the user with information Should follow the house style of the company using it Information should flow in a logical order to the user		4

7 There are many types of storage device.

Explain the purpose of storage devices. You should refer to hard disk drives (HDDs), solid-state drives (SSDs) and pen drives in your answer.

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Question	Answer	Marks
7	**Six** from: The purpose of storage devices is to store data and software for later use/whenever needed The purpose of storage devices is to hold data even when the computer is turned off Storage devices allow users to have non-volatile/permanent/backup copies of data/keep archives Stored data may be loaded back into the CPU for further processing or sent to an output device The device writes data to the medium and reads it from the medium The CPU is able to write data to the hard disk/SSD/Pen drive in the form of formatted files The CPU is also able to read data and software from the hard disk/SSD/Pen drive in readiness for processing to take place Pen drives are used to store data to be transferred <u>from one computer to another</u> because of ease of portability Solid-state drives/HDD tend to be fixed and form the basic internal storage unit of computers Allow 4 general points but must include examples for full marks	6

10 In a medical expert system, the inference engine receives symptoms from the user interface.

Explain how the inference engine uses these inputs to produce possible diagnoses.

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Question	Answer	Marks
10	**Five** from: Inference engine finds possible diagnoses by using <u>a form of reasoning</u> The inference engine uses the data or facts in the knowledge base to reason through the symptoms The reasoning involves forward chaining, backward chaining or a combination of both Inference engine compares symptoms to those in the knowledge base Inference engine uses the rules base of <u>IF…THEN…</u> rules/comparisons Description of forward chaining Description of backward chaining	5

2 **(a)** Tick the most accurate statement referring to software.

	✓
An operating system is an example of application software.	
Software consists of data or computer instructions.	
Software consists of RAM and ROM chips.	
A buffer is an example of application software.	

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(b) Tick the most accurate statement referring to system software.

	✓
A spreadsheet is an example of system software.	
A blu-ray disc is an example of system software.	
A printer driver is an example of system software.	
Control software is an example of system software.	

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Question	Answer		Marks
2(a)	An operating system is an example of application software.		1
	Software consists of data or computer instructions.	✓	
	Software consists of RAM and ROM chips.		
	A buffer is an example of application software.		

Question	Answer		Marks
2(b)	A spreadsheet is an example of system software.		1
	A blu-ray disc is an example of system software.		
	A printer driver is an example of system software.	✓	
	Control software is an example of system software.		

8   After a program is written in a high-level programming language, it has to be converted into a lower level of language.

Evaluate, by weighing up the advantages and disadvantages, the use of an interpreter for this purpose.

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Question	Answer	Marks
8	**Six** from: *Advantages* Source code will run on different computers and operating systems Only needs to maintain one version of the source code Less time will be spent on source code maintenance … … when updates are needed It is easier to debug the program … … as errors are highlighted/user is alerted as they are encountered It can use up less memory than a compiler … … as only a few lines of source code are in memory at a given time Less likely to crash the computer … … as the code can run in a virtual mode *Disadvantages* The translation software may need to be kept up to date Interpreted programs run slower than compiled programs … … as they have to be interpreted every time they are run Interpreting a program is a much slower process <u>than compiling</u> … … as it stops every time an error is encountered Source code is easier to convert by fraudulent users Makes it much easier to copy the program **At least one of each required to obtain full marks** **Must be a proper evaluation to obtain full marks** **Max. five marks if bullets/list of points** **Must have an expansion or comparison to be a proper evaluation**	6

2 An interpreter is a type of system software.

Describe how an interpreter operates.

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Question	Answer	Marks
2	**Four** from: Translates a high-level language program... ...into an intermediate stage Translates a line of source code and then executes that line/statement Translates instructions one at a time Reports on errors as lines of source code are processed An interpreter has to be resident in memory in order for the program to run Only a few lines of the program need to be in memory at any one time	4

3 Mainframe computers are particularly suited to carrying out the transaction processing of online banks.

(a) Describe the features of a transaction processing system.

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(b) Discuss the advantages and disadvantages of the use of mainframe computers.

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Question	Answer	Marks
3(a)	**Three** from: A transaction processing system's performance is measured by the number of transactions it can process in a given period of time The system must be continuously available The system must be able to maintain the integrity of the data and overcome hardware or software problems It must also be possible to individually upgrade hardware and software components without shutting down the system There should be controlled access, allowing only authorised users to use the system	3

Question	Answer	Marks
3(b)	**Eight** from: *Advantages* They can perform hundreds of MIPS/have faster processing than PCs, laptops and other devices. They have a high value of mean time between failures (MTBF) so usually do not have any time where the system is down … …PCs/laptops/other computing devices can crash more often They have greater fault tolerance than other systems… …they can transfer processing from one core to another… …so hardware and software upgrades can occur while the system is still in operation They can run different operating systems so can handle different types of database They are more secure than most other types of computer as they use complex encryption systems. *Disadvantages* They are very expensive to buy/install … …some organisations are changing to using the cloud rather than buying a mainframe… …there is a higher cost for the people needed to manage them… …which is not the case with cloud-based computing The software required to run a mainframe is more expensive to buy than using cloud computing Mainframes need large rooms to accommodate them They generate a lot of heat… …cooling systems are expensive to buy, install and run **Must have at least two of each to gain full marks** **Must be a proper discussion to obtain full marks** **Max. six marks if bullets/list of points** **Must have expansions or comparisons to be a proper discussion**	8

5   Here is a diagram showing the component parts of a hard disk drive.

(a) Describe the component parts of a hard disk drive. Refer to the labelled diagram in your answer.

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(b) Explain what is meant by disk defragmentation and why it is needed when using hard disks.

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Question	Answer	Marks
5(a)	**Six** from: A is a track, B is a sector, C are read-write heads, D is a cylinder, E are surfaces, F is a platter (3 marks for all 6 correct, 2 marks 5 correct, 1 mark for 3 or 4 correct) A hard disk drive consists of several platters which are individual disks Each surface of a platter has its own read/write head The read/write heads move across the platters/surfaces stopping only to read <u>data</u> from or write <u>data</u> to the surface... ... never touching a disk surface each of which is used to store data Each surface is divided into several tracks which are in the same position on each disk The track on the top platter together with the tracks exactly below it, form a cylinder Each track is divided into sectors	6
5(b)	**Four** from: Organises the contents of the disk into the smallest number of contiguous regions/fragments... ...by moving the data blocks of a file/defragmented files around to bring whole/all the parts of a file together Attempts to create larger regions of free space Some defragmentation utilities try to keep smaller files within a single directory together It is the rearranging of files stored on a disk The movement of the hard drive's read/write heads over different areas of the disk when accessing fragmented files is slower... ...compared to accessing the entire contents of a non-fragmented file sequentially... ...data retrieval is made easier and quicker	4

11 A gesture based interface is a type of user interface.

Describe the advantages of using a gesture based interface rather than other types of interface.

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Question	Answer	Marks
11	**Five** from: Gestures may be a quicker way of initiating a response from a device People who have speech impediment can find a gesture based interface useful rather than dialogue Gestures will still be reliable if there is background noise or user has a cold/strong dialect/accent which would affect a dialogue interface Dialogue interface often requires a training session with user whereas gestures can be taught through manuals Users with physical handicaps may find it easier to make gestures rather than gripping a mouse Don't have to learn so many commands as with a CLI For reasons of hygiene doctors/health workers/restaurant chefs may not be allowed to touch a display or device using a GUI… …appropriate gestures are a more hygienic way to control the device	5

4 The performance of mainframe computers and supercomputers is often measured using performance metrics.

Compare, by describing the similarities and differences between them, the different types of performance metrics.

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Question	Answer	Marks
4	**Six** from: *Similarities* Both are used to measure performance speeds of computers/processors Both can be unreliable as the complexity of instructions can vary according to which <u>benchmark</u> program/test is used/complex instruction takes longer to process than a simple one *Differences* MIPS are used with mainframes (M)FLOPS used with supercomputers MIPS can be used with integers (M)FLOPS with real/floating point numbers MIPS measured in millions (M)FLOPS measured in quadrillions and higher MIPs is millions of instructions per second, FLOPs is floating point operations per second (must have both) MIPS used when measuring performance of computers involved in running application software… …whereas FLOPS used where scientific/complex calculations need to be carried out MIPS do not take into account input/output speeds… … whereas FLOPS do not take into account CPU's clock speed , bus speed, the amount of RAM available **Must have at least one similarity and difference to gain full marks**	6

5 When a high level language program is written, it has to be translated so the computer can run it. This can be achieved using a compiler or an interpreter.

Discuss the advantages and disadvantages of using a compiler rather than an interpreter.

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Question	Answer	Marks
5	**Eight** from: *Advantages* Once it is compiled a program does not have to be translated again A compiled program can run faster than interpreted software Compiling a program is a much quicker process /translates it faster than interpreting… … as whole program is translated all in one go /all at once … …unlike interpreter translates one line at a time Once the program is already compiled into machine language, there is no translation software that the user has to keep up to date Compilers also improve security for programmers… …makes it much harder to copy code/machine code is difficult to understand and alter… …so fewer risks of copyright infringement… … with an interpreted program, the source code can always be seen so greater risk of software copyright infringement *Disadvantages* Can only be used on one operating system … source code can be interpreted on any operating system provided interpreter is present… …will need to use an interpreter if program is to be shared… It is slow/(more) difficult to debug the program/find errors… …the whole program needs to be compiled again after an error is corrected… …error messages are output at the end… …whereas with an interpreter error messages are output <u>as they are found</u> It uses up more memory than an interpreter… …as whole program has to be loaded… …interpreter only requires a few statements of the program to be in memory Unlike an interpreter, does not allow small pieces of code to be tested to make sure they work before continuing with the rest of the program More likely to crash the computer as it is running directly on the CPU **Must have at least two of each to gain full marks** **Must be a proper discussion to obtain full marks** **Max. six marks if bullets/list of points** **Must have expansions or comparisons to be a proper discussion**	8

2 Explain how high level language programs can be translated to run on different computer systems, including any difficulties which may result from this.

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Question	Answer	Marks
2	**Four** from: An interpreted program will still <u>be in its original source code</u> so it will work on <u>any system</u>… …but must have an appropriate interpreter Only use high level languages which can be interpreted With languages which are compiled can use a cross compiler… …so programs can run on a computer with a different operating system/target computer… Cross compilers can be a smaller version of the compiler which is normally used on the host computer/native compiler A problem with using a cross compiler is that the compiled program will no longer run on the computer the program was written on/host computer The cross compiled code can run more slowly than if it had been originally compiled on the target machine A cross compiler produces more errors and mistakes than a native compiler	4

4 The directors of a company wish to create a database of customers. They are not sure whether they should ask a computer programmer to produce custom written software or they should purchase off-the-shelf software.

(a) Describe the features of custom written software.

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(b) Describe the features of off-the-shelf software.

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Question	Answer	Marks
4(a)	**Four** from: Software that is specially developed for a specific company/business It is made to accommodate that customer's particular preferences and needs Written by programmers to solve specific problems Owned by the business that commissions it It is made from scratch Support is obtained directly from the creators Development costs have to be paid for by client for whom its written/ commissioning company/business	4
4(b)	**Four from:** Software that is ready-made/ready for use and already exists/can be used immediately It is available to all businesses and companies/general public/everyone It is owned by the company that created it/users only have a licence Has to be adapted to fit the business that has purchased it Development costs are spread amongst several customers Support is obtained from help desks/call centres/user forums run by the producers of the software	4

5 A doctor drives to work. While at work and while travelling, the doctor uses a number of IT-based devices. She uses a dialogue interface to control these devices.

Discuss the advantages and disadvantages of the doctor using a dialogue interface rather than a graphical user interface (GUI).

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Question	Answer	Marks
5	**Eight** from: *Advantages* For reasons of hygiene a doctor may not be allowed to touch a display or device... ...speaking into a microphone is a more hygienic way to control the device Dialogue interface allows hands free control / ensures safety when driving... ...whereas GUI would need at least one hand to leave the steering wheel Dialogue interface does not require doctor to be sat in front of computer/device so can operate computer/device remotely/allows doctors to be doing other things/tasks at the same time/multitask Users with physical disability may not be able to use a keyboard or mouse... ...or control their limbs accurately... ...could speak into a microphone to control a device *Disadvantages* Some background conversation may result in a reaction from the device... ...GUIs more likely to require actions to be deliberate Doctors who have a speech impediment may find a dialogue interface too difficult to use Dialogue interface may not operate reliably if there is background noise... ...commands might be misinterpreted/misheard Dialogue interface may not operate reliably if doctor has a cold/strong dialect/accent... ...while GUI will still be reliable Dialogue interface often requires a training session with user/doctor... ...use of GUI can be taught through manuals Dialogue interface can be more expensive to develop compared with a GUI Dialogue interface is not suitable for safety dependant commands such as 'stop' as it would not be as easily understood as GUI **Must have at least two of each to gain full marks** **Must be a proper discussion to obtain full marks** **Max. six marks if bullets/list of points** **Must have expansions or comparisons to be a proper discussion**	8

1   Computers often have utility software supplied with the operating system.

Explain what is meant by utility software and why it is needed.

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Question	Answer	Marks
1	**Three** from: • A program that helps perform maintenance (in a computer system) (1) • A program that performs a specific task ... (1) ... usually related to managing system resources (1) • Operating systems can contain a number of different utilities/types (for managing files and storage devices) (1) • Identified suitable example (e.g. file management/storage device) (1) **One** from: • Generic statement of why utility software is required (1) e.g. • It is needed to keep the computer free from viruses (1) • It is needed to make the files contiguous (1) • It is needed to improve the computer's performance by managing the allocation of computer memory (1)	4

8 Maria has been asked to write a word-processed report for her homework. She needs to choose between using proprietary software and open source software.

Describe the differences between these two types of software.

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Question	Answer	Marks
8	**Six** from: • Proprietary software is owned by the copyright holder//not owned by the user (1) • Proprietary software users have to purchase a licence/pay to use it ... (1) ... open source software is usually free to download// includes a request for a donation to charity (1) • There are **almost always** restrictions on the use of proprietary software ... (1) ... open-source software can be used/accessed/implemented by anyone (1) • The specific terms of use are included in an end-user license agreement (1) • The source code of proprietary software is a secret ... (1) ... open-source software source code is open to inspection (1) • Usually covered by copyright which provides a legal basis for its owner to establish exclusive rights ... (1) ... open-source software code can sometimes be amended without breach of copyright legislation (1)	6

2   Describe what is meant by the term RAS (Reliability, Accessibility and Serviceability) when applied to mainframe computers.

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Question	Answer	Marks
2	**Five** from: • Describes the robustness/durability of mainframe computers (1) • **Reliability is** the chance of the system behaving as intended (1) • **Accessibility refers to** the mainframe being operational at all times//the operating time as a percentage of total time (1) • **Serviceability means** it can be **easily fixed** within a **short period of time** (1) • Mainframes are reliable as the system will use alternative methods to carry out tasks (if there is a failure) (1) • The system's software is reliable as it is extensively tested and updates are made quickly to overcome problems (1) • Mean time between failures (MTBF) is quite long for mainframes (1) • Mainframes give months/years between system downtimes (1) • Even when unavailable (due to failure) a mainframe is unavailable for a very short time (1) • Spare components/CPU are often included in mainframes so that if one component/CPU fails another takes over (1) • The mainframe can determine why a failure occurred (1) • This enables hardware and software components to be replaced without affecting the mainframe's operations (1) • Can be serviced while the system is still running (1)	5

6 Explain why supercomputers are used for weather forecasting.

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Question	Answer	Marks
6	**Four** from: • A supercomputer is fast/powerful/run at several petaflops **enough to carry out the calculations that are required** for weather forecasting (1) • A supercomputer can process **huge** amounts of data// a supercomputer is needed because a **huge** amount of data is collected (1) • Weather forecasting is based on the use of very complex/scientific computer models (which only supercomputers can handle) (1) • A sophisticated/three-dimensional model of the earth's atmosphere/ocean/space has to be created (which needs the processing power of a supercomputer) (1) • (A supercomputer is needed) because a large number of calculations have to be carried out//a supercomputer can do a large number of calculations (1) • Needs to do complex/scientific calculations (1) Max **two** marks for the data that has to be collated: e.g. • records **of previous** weather conditions (1) • weather measurements from weather stations (candidate may exemplify) (1) • observations from radar/satellites (1) • information from ships /aircraft (1)	4

3 Back-up software and anti-virus software are both types of utilities that are often provided with operating systems.

(a) Without detailing the different methods of detection, describe the features of anti-virus software.

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(b) Without referring to the different types of back-up, describe the features of back-up software.

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Question	Answer	Marks
3(a)	**Three** from: • **Scans the computer** to make sure it isn't infected with a virus/to find viruses (1) • Can scan whole disk **or** individual files (1) • Can be set up to scan **automatically//**run at a set time (1) • Compares with a database/existing viruses (1) • Detects changes in behaviour of files (1) • Quarantines the infected programs (1) • Reports results of scan to user (1) • It will ask the user whether or not they want to delete the infected programs (1) • Does background scans of downloads and attachments (1) • **Automatically** update itself (1)	3
3(b)	**Three** from: • Creates additional copies of files/data/databases/hard disks/ network servers (accept 'duplicates') (1) • Backed up//copy of (e.g.) files are still available in the event of data loss//if **computer is corrupted/computer fails/(accidental) deletion/other example of data loss** (1) • Can use these copies **to restore** the original contents in the event of data loss//if **computer is corrupted/computer fails/(accidental) deletion/other example of data loss** (1) • Asks user to enter type of back-up (1) • Can happen automatically (accept reverse argument) (1) • Asks if you wish to restore the back-up (1) • Asks if you wish to verify the back-up (1) • Asks when back-up is to take place/frequency of backups (1) • Ask which medium the user wishes to store/restore backup (1)	3

6 The IT department manager in a company has decided new software is needed to run the payroll system. She will make a choice between using off-the-shelf software and custom written software. She is already aware that there are differences in the level of support offered and the amount of testing that will have been carried out on the software.

Discuss the other advantages and disadvantages of choosing off-the-shelf software compared to choosing custom written software.

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Question	Answer	Marks

6	**Eight** from:
	
	***Advantages** Max **six** from*
	
	• Off-the-shelf software is cheaper to buy (1)
	  ... as it is mass produced/cost is spread between customers (1)
	  ... whereas with custom written software it costs more to pay programmers to write code specifically for the task/user's needs ... (1)
	  ... written for one purpose/don't share development costs with other users (1)
	• Off-the-shelf software is **already available**//available <u>straight away (or very near equivalent)</u> ... (1)
	  ... whereas with custom written software **client would need to wait** whilst the software was being developed (from scratch) (1)
	
	***Disadvantages** Max **six** from*
	
	• Off-the-shelf may need to be adapted for use which can be difficult ... (1)
	  ... there may be settings within the software that cannot be changed ... (1)
	  ... whereas custom written software is designed specifically for the task/company requirements (1)
	• Off-the-shelf software may not have all the features//may not meet needs of the/ required by the company ... (1)
	  ... whereas with custom written software the programmer can ensure the software will have all the features that are required (1)
	• Off-the-shelf software may have unnecessary features ... (1)
	  ... whereas the programmer will make sure that custom written software has <u>only</u> the features required (1)
	• Off-the-shelf software may not be fully compatible with the company's computer system ... (1)
	  ... whereas the programmer will have taken the computer system into account making sure that the software is compatible with it (1)
	
	Max six marks if bullets/list of points
	Max six marks if no attempt at expansion
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2 A linker is a type of system software used during the process of translating high level language programs to machine code.

Discuss the benefits and drawbacks of using a linker.

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Question	Answer	Marks

2	**Up to Six marks available:**
	
	Benefits Max 5
	• Programs can be written in modules (1)
	  – …which requires less RAM (1)
	  – … so saving cost of memory (1)
	• Whole program and compiler don't need to be in memory at the same time (1)
	  – …which requires less RAM (1)
	  – … so saving cost of memory (1)
	Both extension marks above may be given twice (once per first mark item) where used appropriately.
	
	• A number of programmers can be used to write separate modules … (1)
	  – …which saves time compared to one person writing the whole code (1)
	• If there is an error in the code only that module has to be corrected (1)
	
	Drawbacks
	• Variable names can cause problems... (1)
	  – ...the same variable may have been given different variable names in different modules (1)
	• Documentation has to be more detailed … (1)
	  – … so takes longer to write (1)
	
	Max. five marks if bullets/list of points
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10 Describe what is meant by the term open source file format. Include in your answer an explanation of why open source file formats are needed.

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Question	Answer	Marks
10	**Max four** from: • A format used for storing data, for anyone to use (1) • An open-source file format can be used by both proprietary and (free and) open-source software (1) • Open source formats are often called free file formats if they are not covered by any copyrights/patents (1) • Anyone may use them at no cost (1) for any desired purpose (1) • Code is open to inspection (1) • Code can **be amended** without breach of copyright (1) **Max three** from: • Needed because not everyone can afford proprietary software (1) • Needed so users can work on files in different locations without the need for the same software (1) • Provides a standard file type (1)	5

3 Explain why a compiler may not be suitable for translating a high level language program for use on different computer systems.

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Question	Answer	Marks
3	**Three** from: • A compiled program will **only run** (on a computer with) **the same operating system (1st)** **as it was originally translated on** (1) • The (other) computer system it is transferred to **may not have** the **same** operating system (1) • Cross compilers can be used but the compiled program will no longer run on the host computer/computer the program was written on (1) • Cross compiler produces more errors and mistakes than a native compiler (1) • The cross compiled code can run slower than if it had been originally compiled on the target machine (1)	3

6 Back-up software is a type of utility software. A network manager wants to back up the data stored on a server.

(a) Describe, with reasons, the steps the manager takes when setting up this process.

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(b) Some of the data to be backed up consist of audio files. The network manager will compress these before starting the back-up process. Different methods of compression can be used.

Describe these methods giving the effects on the audio files of using each method.

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Question	Answer	Marks

6(a)	**Five** from:
	• Manager checks the space **on the target drive/location** (1st)
	   – to make sure there is **sufficient** space for the data (that will be moved) (1)
	• Manager selects the time they want the back-up to take place (1st)
	   – manager can select to carry out the back up immediately… (1)
	   – **BECAUSE** the back-up takes place at a time convenient to the manager/when the system is quiet (may explain why timing is convenient) (1)
	• Manager selects type of back-up (1st)
	   – backing up only the specified data/files (1)
	   – **BECAUSE** may want to back up whole device OR new files (1)
	• Manager selects how regularly the back-up is to take place (1st)
	   – **BECAUSE** to minimise data loss (1)
	• Manager will decide where back-up is to be stored (1st)
	   – **BECAUSE** to make sure back-up will be secure (1)
	• Manager selects whether to verify the back-up or not (1st)
	   – **BECAUSE** to make sure the backup has been completed correctly (1)
	• Manager chooses whether or not to encrypt the back-up (1st)
	   – **BECAUSE** adds an extra level of security (1)
	
	Must have at least TWO reasons to obtain full marks
		5

Question	Answer	Marks

6(b)	**MAX three** from:
	
	• Can be either lossy or lossless. (1)
	• Lossless compression **reduces** number of bits (1st)
	   – …by identifying repeated patterns of data. (1)
	• No **information** is lost in <u>lossless</u> compression. (1)
	• <u>Lossy compression</u> reduces number of bits (1st)
	   – …by identifying unnecessary information. (1)
	
	Effects max three:
	
	• **Quality** of audio is **the same** when using <u>lossless compression</u> (1)
	• **Quality** of audio is **lower** when using <u>lossy compression</u> (1)
	• **File size** is **smaller** for **lossy** than **lossless** (accept converse) (1)
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5 A printer driver is a type of device driver.

Explain, using a printer driver as an example, what is meant by a device driver and why it is needed.

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Question	Answer	Marks
5	**Five** from: **Four max** from: • A device driver is a piece of (system) software (1) • It operates/controls a device attached to the computer (1) • Allows communication between printer and computer (1) • A device driver tells the operating system/application software how to communicate with a hardware device (1) • A printer driver acts as an interface between the operating system/ application software and the printer (1) • When a document is to be printed the application tells the printer driver and the printer driver tells the printer (1) • The user appears to have control of the device (1) • Upon installation it detects and identifies the peripheral device (1) • Handles the translation of requests between a device and the computer (1) • Defines where outgoing data must be stored before it can be sent (1) **Two max** from: • Without the required (printer) driver the printer fails to work (1) • The software used by a computer tends to be created by different companies to those that manufacture printers (1) • Computers (may) use software which uses a different type of language/instruction set to the printer (1) • The printer driver is needed to convert the language/instruction set so that the software is able to communicate with the hardware (1)	5

4 One of the functions of an operating system is to maintain the security of a computer system.

Describe the **other** functions of an operating system.

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Question	Answer	Marks
4	**Eight** from: • **Manages/operates/controls** computer **hardware** resources (1) • Manages software resources (1) • Interacts with device drivers (1) • Responds to **input** devices/recognises **inputs** (1) • Sends data/instructions to printers/output devices (1) • Manages files/directories (1) • Responds to inputs (1)// interface between the user and the computer (1) • Allocates **memory** to software (1) • In multi-tasking/multi-programming systems allocates equitable processing time to each task/program (1) • Supplies utilities for managing the computer – (may state or exemplify) (1) • Outputs to hardware//interface **between** an application program and the computer hardware (1) • Knows the names of each file and (exactly) where they are stored (on the storage media) (1) • It keeps a record of any empty spaces on the medium to know where new files can be stored (1) • Displays error messages to the user if an error occurs (1) • Opens and closes **files** (on storage devices) (1) • Allows **communication** between attached hardware (1)	8

9 Discuss the advantages and disadvantages of using a gesture-based user interface rather than a graphical user interface to control devices.

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Question	Answer	Marks
9	**Eight** from: **Advantages of GBI/disadvantages of GUI** • Can be advantageous to disabled users … (1) … who maybe cannot control their hands accurately//have limited mobility (1) … could make gestures using their limbs/eyes (1) • For reasons of hygiene a doctor/food worker may not be allowed to touch a display or device … (1) … gestures control the device/ allow them to control devices without touching anything (1) • Gestures may be a quicker way of initiating a response from a device (1) • Some gestures may be unintentional but still initiate a reaction from the device (1) • Gesture based interface does not require person to be sat in front of computer/device so can operate computer/device from a distance (1) • Enhanced gaming experience (1) **Disadvantages of GBI/advantages of GUI** • GUIs tend to be more accurate than gestures (1) • Certain gestures may not be socially acceptable/user could feel uncomfortable making gestures//reduced privacy (1) • Some gestures may be unintentional but still initiate a reaction from the device//GUIs require actions to be deliberate (1) • Gesture based is less effective when several users/background movement involved (1) • **In certain lighting conditions** gesture-based interface may misinterpret/fail to register a gesture (1) • GUIs can be used in any **lighting/dark situations** (1) • Increased danger of injury (1) **Max. six marks if bullets/list of points**	8

3 Companies have the choice of using custom written software or using off-the-shelf software.

Explain the differences between custom written software and off-the-shelf software in terms of:

(a) cost

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(b) level of support

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(c) degree of testing.

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Question	Answer	Marks
3(a)	**Two** from: • Companies have **to pay the programmers** to write the programs which could **cost more** (than buying off-the-shelf software) (1) • Off-the-shelf software is cheaper to buy because it is **mass-produced** (1) • With custom written software **one company pays for the development** because they commissioned it (1st) • with off-the shelf software development costs are spread amongst several customers because it is written for a mass market/generic software (1)	2
3(b)	**Two** from: • With custom written software there may be only one programmer/small team of programmers **so** companies find it difficult to get support (1) • With custom written software, help can be obtained directly from programmers **so** can be more helpful (1) • Help desks/call centres/user forums websites for customers are readily available **because** software is generic//used by a mass audience (1)	2
3(c)	**Two** from: • Custom written software may not have been tested as thoroughly/rigorously as off-the-shelf software as fewer users/shorter lead time (1) • The tests that are carried out on custom written software are those which the programmer thinks are necessary based on how they think the software will be used which not necessarily be how it is eventually used (1) • Off-the-shelf software will have been used many times before companies buy it so any bugs will have been identified and fixed (1)	2

12 Analyse the effectiveness of supercomputers.

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Question	Answer	Marks
12	**Eight** from: • Have a limited lifespan of just a few years (1st) • and will need replacing/repairing (1) • Carries out complex calculations (1) • Can use complex mathematical formulae (1) • Can handle a large amount of items of data at the same time (1) • Are the fastest data processing computers (1) • Are the most expensive computers to buy/install (1) • Each/processor core(s) each have their own operating system (1) • Use massively parallel processing (1) • Are more powerful compared to mainframes (1st) • can be up to a 1000 times faster (1) • Can include scientific rules (1) • Some tasks do not require super computers (1st) • as the task is not complex, so it would be a waste of e.g. resources (1) • Very likely to overheat (1) (and) difficult to keep cool (1) **Max. six marks if bullets/list of points**	8

2 Mainframe computers are used in banking. Supercomputers are used in climate research.

(a) Explain what is meant by a mainframe computer and by a supercomputer with reference to the types of processing and the processors they each use.

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(b) Explain how supercomputers are used in climate research.

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Question	Answer	Marks
2(a)	**MAX two from:** • A mainframe computer can have hundreds of (processor) cores (1) • All cores share//has one Operating System (1) • Mainframes use parallel processing (1) • Can process a large number of small tasks **at the same time** (1) **MAX two from:** • Supercomputers can have **more than 100 000** (processing) cores (1) • Supercomputers use **massively parallel processing** (1) • Each/Processor core(s) each has their own operating system (1) • Supercomputers use more than one GPU (1)	3

Question	Answer	Marks
2(b)	**Four** from: • Many (types of) variables are collected (1) • Complex **calculations** carried out (1) • Identifies TWO items measured by sensors **for this purpose** (1) • Large quantity of data is collected/handled/processed (for each variable) (1) • Shows the (historical) trends of different variables **over several decades/long** period of time (1) • (Complex) mathematical formulae are used to describe how the different parts of a climate system interact (1) • Computer **models** are used to describe **how the climate will change** (1) • Supercomputer **models** will include several (scientific) rules (1) • **Model** include so many uncertainties//are so complex that there is no known exact solution//answer is a "best guess" (1)	4

3 Give brief descriptions of the following types of user interface.

(a) command line interface ....

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(b) gesture based interface ....

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(c) dialogue interface ....

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Question	Answer	Marks
3(a)	**Two** from: • User **types in** text/instructions//command must be **typed in**//is a text based interface (1) • Prompt appears in screen (after which command is typed in) (1) • Requires fewer resources than GUI (1) • Requires a **keyboard and screen** (1)	2
3(b)	**Two** from: • User **moves** body/identified body part (to communicate with computer//give instructions) (1) • Requires a camera/sensors (to detect the movements) (1) • Computer matches body movements it has stored (in a database) (1) • (Stored) body movements relate **to** (specific) **commands** (1) • One mark for any identified body movement (1) e.g. finger pointing, head nodding, hand waving/raising, eyes rolling/blinking	2
3(c)	**Two** from: • User uses their **voice/spoken word** (to communicate with the computer/give instructions) (1) • Speech recognition software is used to recognise speech (1) • Computer matches speech it has stored (in a database) (1) • Speech is converted into commands//example of command **and** action that follows (1) • Requires a microphone (1)	2

8 Students often transfer files between different word processing and database packages.

Justify the need for generic file formats for the transfer of files between different packages.

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Question	Answer	Marks
8	**Eight** from: • Files created in one software package are sometimes difficult to use/open in other software (1st) • particularly if the packages are incompatible (1) • Generic file formats are compatible with different software packages (1) • When transferring a file to **a different computer/device** it might not load properly (1st) • since generic file formats are needed to enable different operating systems to read the file/because the particular file format will not operate on that OS (1) • Two marks plus extensions for two examples of the use of generic file types (for a total of 4 marks). e.g. • Word processing files should be saved as a .txt file type (1st) • so that database software can understand it (1) • Database files should be saved/exported as a .csv/.txt/.rtf file type (1st) • so that word processing software can understand it (1) **Max 6 marks for just bullet points**	8

2 Irene has produced a document using a word processing package. She has saved it as a text file and also as a separate word processed file.

Give **four** advantages of saving the document as a text file compared with saving the document as a word processed file.

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Question	Answer	Marks
2	**Four** from: • **File size** is smaller (1) • Takes up less **storage** (space) (1) • Text format doesn't need to buy a licence/software (1) • As the file size is smaller the processing time is shorter/less processing power is required (1) • Does not need to be opened by a WP package (1) • Can be opened by more applications (1) • Data can be exchanged between different computers/operating systems (1) • Word processing software has different versions and one version may not open documents produced by a different version (1)	4

3 Mainframe computers and supercomputers are specialised types of computer with some similar characteristics.

Explain what is meant by each of the following characteristics.

(a) fault tolerance

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(b) heat maintenance

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Mainframe computers were developed from the need for computers to process data in tasks such as carrying out a census.

(c) Explain why mainframe computers are used to process the data from a census.

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Question	Answer	Marks
3(a)	**Three** from: • Whether a computer will **repair** itself if an error occurs (1) • Whether a computer can continue to operate even if one (or more) of its components has failed (1st) • without affecting the operation of the system/without downtime (award once only) (1) • Whether a computer's operating **quality** can **reduce**, but does **not fail** completely (1) • Whether when a hardware component/processor fails, **another takes over/elements are hot swappable** (1st) • without affecting the operation of the system/without downtime (award once only) (1) • Whether computers have two different instances/installations/versions of software (1st) • if there is a problem with the first instance/installation/version, the other version is automatically run (1) • this (characteristic) does not apply to mainframes (1)	3
3(b)	**Two** from: • Computers generate heat/become overheated (1). • When a computer overheats, it will address this issue (1). • Overheating of mainframes and supercomputers is a problem (1st) • due to the quality and quantity of processors generating a lot of heat (1) • hence the need for cooling systems (1) • Air cooling systems have been used but uses up a lot of power/are very expensive to build and operate (1) • Water cooling systems are more cost-effective/more efficient (1) • in removing any excess heat (1) • Many data centres are now being built in cooler parts of the world (1)	2
3(c)	**Three** from: • The amount of data that has to be **processed** is very large (1st) • **as** countries tend to have a lot of people (1) • The amount of data is **increasing** (1st) • **as** each census produces more data (to add to what already exists)/world populations are rising (1) • All data needs to be processed in a **short period of time** (1st) • and mainframes have a high speed of processing data (1) • (As more data is added), more powerful machines are needed (1st) • and mainframes are **easily** scalable (1) • Mainframes are very reliable (1st) **MAX two marks if answers are all only first marks.**	3

10 The manager of the payroll department within a company has commissioned a computer programmer to write software to run the payroll.

Justify this decision to use custom written software.

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Question	Answer	Marks
10	**Eight** from: • (This) custom written software is created for a defined/this purpose/running a payroll/commissioned by an individual company/business (1) • Does not need to be adapted for use (1) • (Any) settings built into the software can be changed (1st) • if the software doesn't initially meet the manager's requirements (1) • such as ability to copy software on to several devices (1) • Software will have/Programmer can ensure the software will have all the features that are required (1) • Software will be/Programmer will ensure that it is compatible with the existing system and software (1) • Custom written software will not have any unnecessary/distracting features/bloat ware (1) • The company will own the copyright of the custom written software (1st) • so can sell it to others (1) • Usually takes up less storage space than off-the-shelf software (1st) • so less expensive media/data storage costs (1) **Max 6 marks for just bullet points**	8