

X206/301

NATIONAL
QUALIFICATIONS
2007

MONDAY, 28 MAY
1.00 PM – 3.30 PM

COMPUTING
HIGHER

Attempt **all** questions in Section I.

Attempt **all** questions in Section II.

Attempt **one** sub-section of Section III.

Part A	Artificial Intelligence	Page 10	Questions 22 to 26
Part B	Computer Networking	Page 14	Questions 27 to 31
Part C	Multimedia Technology	Page 17	Questions 32 to 36

For the sub-section chosen, attempt **all** questions.

Read all questions carefully.

Do not write on the question paper.

Write as neatly as possible.



SECTION III

Part C—Multimedia Technology

Attempt all questions.

32. A Web design company is creating a website for BuyBuy supermarket.

(a) The website is to contain multimedia elements such as video.

(i) Describe **one** benefit of including video in the website.

1

(ii) Describe **one** technical implication for the customer of including video in the website.

1

(b) A container file is used to send multimedia to the Web design company.

What is a container file?

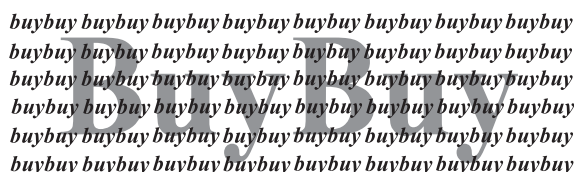
1

(c) The supermarket logo is shown below.

Figure A



Figure B



(i) What additional attribute is present in the logo in Figure B?

1

(ii) Name **one** file type which supports this attribute.

1

(d) The final image created is 2 × 3 inches at 2048 dpi and has a file size of **exactly** 72 Mb.

What is the colour depth of the image?

4

(e) The supermarket is also planning an interactive multimedia information service within their stores.

Which type of application software would you recommend for the creation of this information service? Justify your answer.

2

[Turn over

SECTION III

Part C—Multimedia Technology (continued)

32. (continued)

- (f) The image on the opening screen of the information service is shown below. The image has bands of colours instead of a gradual transition between colours.

Name and describe **one** technique that could be used to improve the appearance of the bands of colour.

2



33. Lewis has purchased some music on-line. His computer contains a sound card which is used when playing the music.

- (a) Describe **two** features of a sound card. 2
- (b) It is often necessary to *normalise* a sound file.
- (i) Why is it often necessary to normalise a sound file? 1
- (ii) How is *normalisation* achieved? 1
- (c) Describe **two** ways in which compression can be achieved using the MP3 file format. 2
- (d) Calculate the uncompressed file size of a 2½ minute audio clip recorded in stereo at 44.1 kHz using 65536 different sounds. Show all your working. 4

SECTION III

Part C—Multimedia Technology (continued)

34. (a) Vanessa buys a 2 Gb USB pen drive, a solid state storage device, and connects it to the USB port on her computer. The manufacturer claims that data could be transferred at rates up to 480 megabits per second. The actual transfer rate is 125 megabits per second. Suggest **one** reason for this. 1
- (b) Vanessa is transferring a 1.4 Gb file from the pen drive to the hard drive of her computer. How long will it take to transfer this file at 125 megabits per second? 2
- Multimedia technology is constantly improving. Improvements include communications and storage technologies.
- (c) One recent development is Firewire.
- (i) What is Firewire used for? 1
- (ii) State **one** reason why Firewire is a popular choice for communications. 1
- (d) State **two** technological factors influencing the growth of multimedia communications. 2
35. The department of medicine use various graphics packages for teaching.
- (a) The students use vector graphics to create 2D diagrams. Describe **two** advantages of using vector graphics over bit-mapped graphics. 2
- (b) The images created have to be changed into 3D. Describe **two** additional attributes used for a 3D image. 2
- (c) State **one** method of creating 3D images. 1
- (d) A simulation program is used to train students on routine operations. The simulation is currently run on flat screen monitors. The lecturers have read an article about Real 3D displays.
- (i) State **one** advantage of using a Real 3D display over a flat screen monitor. 1
- (ii) State **one** disadvantage of using a Real 3D display over a flat screen monitor. 1
- (e) A DVD does not have sufficient storage capacity to store the simulation program. A hard disk has sufficient capacity but is still unsuitable.
- (i) State a suitable alternative optical backing storage technology 1
- (ii) Explain why this method of storage is more suitable. 1

[Turn over for Question 36 on Page twenty

SECTION III

Part C—Multimedia Technology (continued)

36. The band Atomic Heatwave have just finished filming a video for their latest single at a castle.
- (a) State an item of hardware required to transfer the digital video from the camera to the computer. 1
- (b) Describe how video is compressed and stored using the MPEG format. 3
- (c) *Container* files are also used in multimedia.
State **one** example of a typical “container” file for video. 1
- (d) (i) Name **two** features of video editing software that may be used when the Atomic Heatwave video is being put together. 2
- (ii) Describe the **two** features named in part (i). 2
- (e) Atomic Heatwave wish to put video onto their website. The file size is extremely large. Other than compression, describe **two** methods that could be used to reduce the file size. 2
- (50)**

[END OF SECTION III—PART C]

[END OF QUESTION PAPER]

X206/301

NATIONAL
QUALIFICATIONS
2008

MONDAY, 2 JUNE
9.00 AM – 11.30 AM

COMPUTING
HIGHER

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Part A	Artificial Intelligence	Page 11	Questions 18 to 22
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Part C	Multimedia Technology	Page 18	Questions 27 to 30

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Read all questions carefully.

Do not write on the question paper.

Write as neatly as possible.



SECTION III

Part C—Multimedia Technology

Attempt all questions.

27. A multimedia application called “Chef” is to be created to accompany a new cookbook. The software development process is applied to the creation of “Chef” software.
- (a) The purpose of the multimedia application is one aspect which must be investigated during the *analysis* stage.
State **two** other aspects which must also be investigated. 2
- (b) Presentation software allows the inclusion of media elements and the use of hyperlinks to move between pages.
Describe **two** advanced features of authoring software which make it more suitable for creating a multimedia application. 2
- (c) Describe **two** ways in which “Chef” should be tested. 2
- (d) When “Chef” is released, it is distributed along with software used to view the application.
- (i) State **two** benefits of this distribution method for the user. 2
- (ii) State **one** benefit of this distribution method for the software development team. 1
- The performance of a multimedia application can depend on the hardware components of the system. These could include a powerful processor and the use of *holographic storage*.
- (e) Explain how the use of a more powerful processor will benefit the performance of a multimedia application. 2
- (f) Explain how **holographic storage** can be used to store terabytes of data. 2
- (g) Other than processing and storage, name **one** development in computer **hardware** and describe how it has supported advances in multimedia. 2

SECTION III

Part C—Multimedia Technology (continued)

28. The image shown below is being used in the advertising campaign for a new dog biscuit called “Bonzo Bites”.



- (a) The original image is a bitmap file.

Explain the purpose of a *CLUT* in this file format.

1

- (b) Describe a benefit of using a *CLUT* when applying effects to a bitmap image.

1

The biscuit name was created using graphics software. It was saved as a graphic file type. It is shown below.

Bonzo Bites

- (c) (i) State the technique that could be applied to the text to improve its appearance.

1

- (ii) Explain how the use of this technique improves the appearance of the text.

2

The text is added onto the image. The text appears in a white box as shown below.



- (d) (i) Name the feature which will avoid showing the white box.
- (ii) Name **one** graphics file format that provides this feature.

1

1

SECTION III

Part C—Multimedia Technology (continued)

28. (continued)

- (e) The image file is edited and saved as a compressed bitmap file.
- (i) Describe how the *RLE* compression method reduces the file size. 2
- (ii) Explain why this compression method may **not** be effective on this image file. 2
- (f) *Object oriented* data storage is more efficient than *bitmap* storage.
- (i) Explain when this statement is **not** true. 2
- (ii) Name and describe **one** file type suitable for 3D object oriented data storage. 2

29. A website is being developed for Write Rhymes, a company that writes poems and rhymes.

- (a) A video clip is placed on the home page. It contains a child introducing the company by reciting a rhyme. The video will be played using *streaming*.
- (i) What is meant by the term “streaming”? 1
- (ii) Describe **one** reason why it was decided to stream the video clip. 1
- (b) The video clip was recorded using 15 frames per second in 24 bit colour depth with 600×800 pixels. The clip lasts for 2 minutes.
- Calculate the file size of the video clip. Ignore sound and compression in your calculation. Show all working and express your answer in appropriate units. 3
- (c) The font used on each page was specially created for Write Rhymes. When the pages are viewed by potential customers they see a substitute font instead.
- What should have been done to ensure this font is shown correctly? 1
- (d) On the birthday rhyme page, audio clips of sample rhymes can be played. Each rhyme is stored as a *RIFF* file.
- (i) Name the *codec* used by RIFF. 1
- (ii) Describe the technique used for compression by this *codec*. 1
- (e) The rhymes are recorded in mono.
- Explain why the recording was not made in stereo. 1
- (f) Copyright is held by Write Rhymes for all content on the website.
- Describe **two** examples of how users could breach copyright. 2

SECTION III

Part C—Multimedia Technology (continued)

30. A choir use a recording studio to produce their own CD.
- (a) The vocals for each track are captured using *digitised sound*.
 Explain the term “digitised sound”. 1
- (b) The backing music for each track is an instrumental MIDI file.
- (i) State **one** reason why MIDI would produce a high quality sound. 1
- (ii) MIDI has a small file size compared to digitised sound.
 State **one** further benefit that MIDI has over digitised sound. 1
- (iii) State **two** reasons why some musical artists do not use MIDI. 2
- (c) The vocals and backing music are combined to produce each completed track.
 Name **two** features of sound editing software and explain how **each** may be used to improve the completed track. 4
- (50)**

[END OF SECTION III—PART C]

[END OF QUESTION PAPER]

X206/301

NATIONAL
QUALIFICATIONS
2009

THURSDAY, 4 JUNE
9.00 AM – 11.30 AM

COMPUTING
HIGHER

Attempt **all** questions in Section I.

Attempt **all** questions in Section II.

Attempt **one** sub-section of Section III.

Part A	Artificial Intelligence	Page 11	Questions 24 to 28
Part B	Computer Networking	Page 15	Questions 29 to 32
Part C	Multimedia Technology	Page 19	Questions 33 to 36

For the sub-section chosen, attempt **all** questions.

Read all questions carefully.

Do not write on the question paper.

Write as neatly as possible.



SECTION III

Part C—Multimedia Technology

Attempt all questions.

33. The company VideoStream specialises in video recording devices.

(a) Ten years ago, VideoStream’s best selling product was their VS32 video capture card. Due to advances in video camera technology, the VS32 video capture card is no longer for sale.

(i) One of the main components of the video capture card is the DSP. Describe the role of the DSP. 1

(ii) Describe the technological advance in video cameras that has resulted in the drop in sales of **all** video capture cards. 1

(b) Derek has bought VideoStream’s latest video camera that comes with free video editing software.

(i) Derek records a two minute video using 24-bit colour and a 1000 by 800 pixel frame size at 10 frames per second. Calculate the file size of the uncompressed video. Show all working and express your answer in appropriate units. 3

(ii) The settings in part (i) produced a poor quality video. Explain why the video is poor quality. 1

Derek records several video clips and tries out the free video editing software. He loads the video clips and then uses two features of the video editing software to edit the video as shown below.



(iii) Name **two** features of the video editing software that Derek has used to edit the video. 2

(c) The default format for saving video clips from all VideoStream’s products is AVI. AVI is an example of a *container file*.

Explain why AVI is a “container file”. 1

(d) MPEG is a compressed video file type. Describe how MPEG achieves compression. 3

[Turn over

SECTION III

Part C—Multimedia Technology (continued)

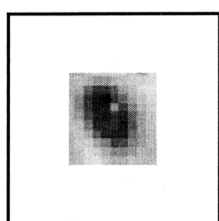
34. Harpreet is an experienced website creator. She uses a WYSIWYG editor rather than a text editor to create a website.

(a) Compare the use of a WYSIWYG editor and a text editor in producing the website, in terms of their demand on system resources. 2

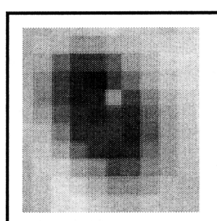
(b) As part of a graphic for the website, Harpreet scanned the image of an eye using 24-bit colour.

Describe how a scanner captures an image. Your answer must contain an appropriate level of technical detail. 3

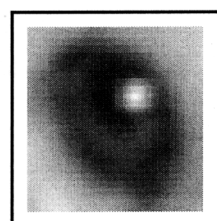
(c) After scanning, Harpreet scaled the eye and used *image manipulation software* to adjust the image.



Original
scan



After
scaling



After
adjustment

(i) Name the feature of image manipulation software that Harpreet used to carry out the adjustment. 1

(ii) Explain how this feature is able to improve the image of the eye. 1

(iii) Name and describe a *compression technique* that would allow Harpreet to reduce the file size of the 24-bit colour eye without losing any image quality when it is decompressed. 2

(d) Harpreet would like music to be playing in the background while each web page is being viewed. The music can either be stored as a MIDI file or a compressed MP3 file.

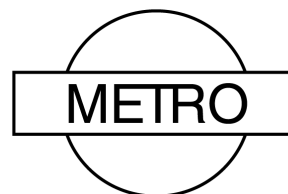
(i) Describe **one** way that the file size is reduced when saving a sound file as a compressed MP3 file. 1

(ii) State **two** advantages of storing the music for Harpreet's web page using MIDI rather than MP3. 2

SECTION III

Part C—Multimedia Technology (continued)

35. The logo for a transport system was created as an *SVG* graphic and is shown on the right



- (a) *SVG* is an example of a *vector graphic* file type. Name **one** other vector graphic file type. 1
- (b) Explain why the above logo can be stored more **efficiently** as an *SVG* graphic than in the equivalent bit-map graphic. 1
- (c) Choose **one** of the objects in the metro logo above and show how it would be represented in *SVG* code.
Your answer should include the **name** of the object and at least **two** attributes. 2
- (d) A small part of the *SVG* code for the logo is shown below.

rgb(0,0,255)

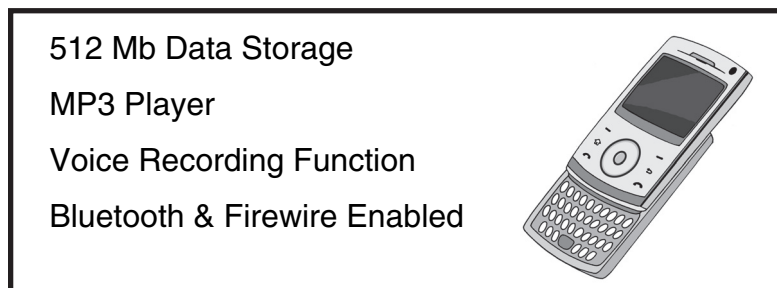
- (i) State which colour is represented by this code. 1
- (ii) The largest number that can be entered in to the **rgb** instruction shown above is 255.
Calculate the bit depth of that object. Show **all** working. 2
- (e) The logo was converted to *3D* and a *texture* applied to it.
Explain the term “texture” in relation to *3D* graphics. 1
- (f) The logo was converted to a bit-map so it could be **animated**.
Name a bit-map format that would be suitable for storing the animated logo. 1

[Turn over

SECTION III

Part C—Multimedia Technology (continued)

36. FoneSmart is releasing the latest version of their highly successful smart phone.



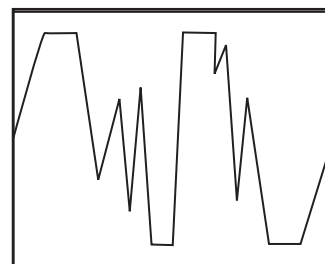
- (a) A multimedia presentation has to be designed and created for the launch of the latest version of the phone.
- (i) State **two** elements that should be included in the **design** of a multimedia presentation. 2
- (ii) Describe **two** reasons why FoneSmart may wish to create the presentation in *multimedia authoring* software rather than *presentation* software. 2
- (b) The phone has a voice recording function. This allows the phone to record the user's voice using 8-bit mono sound at 22 kilohertz. The recording is then stored on a flash memory card.
- (i) Calculate the file size of a 30 second voice recording. Express your answer in appropriate units. Show all working. 3
- (ii) Calculate how many of these 30 second voice recordings can be stored on a 512Mb flash card. Show all working. 1
- (iii) One of the advantages of using a flash card in the phone, rather than optical or magnetic storage, is its portability.
- Describe **one** other advantage of using a flash memory card in the phone compared to optical or magnetic storage. 1
- (c) Voice recordings may be stored using either *PCM* or *ADPCM*.
- (i) State **one** advantage of storing the recording using *ADPCM* compared to *PCM*. 1
- (ii) Describe how *ADPCM* stores sound data. 1

SECTION III

Part C—Multimedia Technology (continued)

36. (continued)

- (d) FoneSmart have received complaints that some voice recordings are unclear. The waveform of one of these recordings is shown on the right.



Explain why this recording is unclear.

1

- (e) Music files can be transferred to the phone by connecting the phone directly to a computer using either *Bluetooth* or *Firewire*.
- (i) State **one** advantage of using “Bluetooth” rather than “Firewire” for transferring music files to the phone.
- (ii) State **one** disadvantage of using “Bluetooth” rather than “Firewire” for transferring music files to the phone.
- (f) Explain how this smart phone demonstrates *convergence of technology*.
- (g) FoneSmart are designing a new smart phone that will use *holographic storage*.

1

1

1

This phone will have a larger storage capacity and a faster data transfer rate than previous phones.

- (i) Explain how holographic storage achieves a very high storage capacity.
- (ii) Explain how holographic storage achieves a very high data transfer rate.

1

1

(50)

[END OF SECTION III—PART C]

[END OF QUESTION PAPER]

X206/301

NATIONAL
QUALIFICATIONS
2010

THURSDAY, 3 JUNE
9.00 AM – 11.30 AM

COMPUTING
HIGHER

Attempt **all** questions in Section I.

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Part A	Artificial Intelligence	Page 10	Questions 18 to 22
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Read all questions carefully.

Do not write on the question paper.

Write as neatly as possible.



SECTION III

PART C—Multimedia Technology

Attempt all questions.

27. Two photographs are to be used as the basis for an animation. A digital camera is used to take the photographs.



- (a) Describe in detail how an image is captured and converted into a digital format by the camera. 3
- (b) Each frame in the completed 12 second animation is held as a GIF with a resolution of 640×480 pixels. The animation has a frame rate of 24 frames per second.
- Calculate the file size of the animation before compression. State your answer using appropriate units. Show all working. 4
- (c) The animation is tested on different computers and the colours displayed in the animation vary slightly.
- (i) State which software technique could reduce this colour variation problem. 1
- (ii) Explain how this technique reduces this colour variation problem. 2
- (d) The animation files are compressed using LZW. Describe how the *LZW compression technique* compresses files. 2

SECTION III

PART C—Multimedia Technology (continued)

28. A DJ has connected a record turntable to his computer to transfer tracks from his vinyl record collection to his computer.



- (a) Describe **one** function of the *sound card* **during** the transfer of the data to the computer. 1
- (b) The DJ wants to store the tracks with no loss of sound quality.
State a suitable file format for storing the tracks without losing sound quality. 1
- (c) Clips from several tracks are combined into a single file, but one of the clips is too quiet and another is too loud.
- (i) State the technique that should be used to solve this problem. 1
- (ii) Describe how your answer to part (i) solves the problem. 2
- (d) The completed track plays for 5 minutes and is 16 bit stereo with a sampling rate of 44.1 KHz.
Calculate the uncompressed file size of this track. State your answer using appropriate units. Show all working. 3
- The DJ often uses *surround sound* in his shows.
- (e) Explain **one** advantage of surround sound over stereo. 2
- The DJ has stored several tracks as *MIDI* files.
- (f) Describe how individual notes are stored in the MIDI file format. 2
- (g) Describe **one** benefit of using the MIDI file format to store tracks used with surround sound. 2

[Turn over

SECTION III

PART C—Multimedia Technology (continued)

29. The developers of a new digital video camera have to decide which communication interfaces to include in the camera.

The video camera is to be suitable for *streaming* live video.

- (a) Explain **one** reason why a *Bluetooth* interface is unlikely to be chosen for streaming live video. 2
- (b) (i) Recommend the most suitable type of interface for this situation. 1
(ii) Justify your choice in part (i). 2
- (c) State why it would be an advantage to have *hardware codecs* built in to the video camera rather than loading in the software. 2

30. A museum uses multimedia presentations to provide information about various exhibits.

The software that was used to develop the presentations has a *WYSIWYG* interface.

- (a) Explain **two** reasons why *WYSIWYG* would help the developer during the implementation stage. 2

All of the presentations include links to video clips. The video clips are stored in either *MPEG* or *AVI* format.

- (b) Describe how files are stored in the *MPEG* format. 3

- (c) *AVI* does not allow compression but has been chosen for some short clips that are displayed in small windows.

Explain why the *AVI* format is suitable for storing these video clips. 2

Some of the presentations are made available for downloading from the museum website.

- (d) (i) Explain why a *container file* would be used to store the presentations. 2
(ii) Describe **one** problem that may be encountered when using a container file. 1

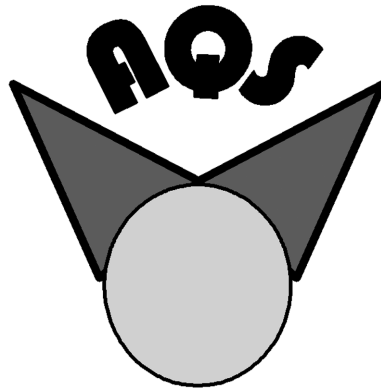
To improve the display of the presentations, the museum upgrades the *graphics cards* on its computers.

- (e) Other than converting signals, state **two** ways a graphics card assists the processor when displaying graphics. 2

SECTION III

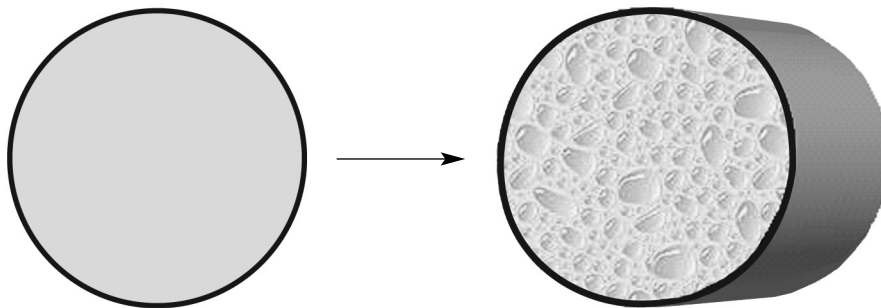
PART C—Multimedia Technology (continued)

31. The logo shown is stored as an *object oriented* graphic.
The logo appears in a variety of sizes on both printed documents and monitors.



- (a) Describe **two** advantages of storing the graphic in *object oriented* format rather than *bitmapped* format. 2

One object in the logo is a circle. The circle is altered so that it is shown in 3D.



- (b) Name **two** additional attributes that require to be stored to create the 3D representation shown. 2
- (c) Name a suitable file format for the 3D logo. 1

(50)

[END OF SECTION III—PART C]

[END OF QUESTION PAPER]

X206/301

NATIONAL
QUALIFICATIONS
2011

FRIDAY, 3 JUNE
9.00 AM – 11.30 AM

COMPUTING
HIGHER

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SECTION III

PART C — Multimedia Technology

25. The logo for a new business has been drawn on paper and then scanned into a computer. The logo is shown below.



- (a) (i) *CCDs* are used by both scanners and digital cameras when capturing an image. Explain how the *CCD* in a scanner differs from those in a digital camera. 2
- (ii) The edges of the scanned logo appeared slightly jagged. *Anti-aliasing* was used to smooth the edges. Describe how anti-aliasing achieves this. 2
- (iii) Explain how *resampling* might remove the jagged edges. 2
- (b) It is suggested that the logo may be stored as a vector graphic. Explain why this logo should be stored as a vector graphic rather than a bitmapped graphic. 2

SECTION III

PART C — Multimedia Technology (continued)

26. The members of the Metro Gnome Jazz Club have decided to create a club website. Members are allowed to download files; visitors can *stream* files.

- (a) (i) Explain the term “stream”. 1
- (ii) Describe **one** advantage to the Jazz Club of only allowing visitors to stream files. 2

Codecs play an important role during the streaming of files and can be implemented in hardware or software.

- (b) A codec codes and decodes streamed files. State **two** other purposes of a codec during the streaming of a file. 2
- (c) Explain the benefit of having codecs implemented in hardware when receiving streamed multimedia files. 2

The website includes a library of sound files stored in MIDI, WAV and MP3 formats.

- (d) Two of the attributes stored in MIDI files are *duration* and *tempo*. Name **one** other attribute stored in a MIDI file. 1
- (e) State **one** type of sound for which MIDI is unsuitable. 1

A particular piece of music is stored in MIDI and MP3 file formats. Both files are the same size.

- (f) (i) Explain **one** advantage of storing files in MIDI rather than MP3 file format. 1
- (ii) A member downloads both versions of the file. Explain why the sound differs when each file is played back. 2
- (iii) State **two** ways that compression is achieved in the MP3 file format. 2

[Turn over

SECTION III

PART C — Multimedia Technology (continued)

27. David is a car racing fan. He records short video clips of races at a local circuit and transfers the clips to his computer for editing. David uses video editing software to join the video clips taken into one continuous video clip.
- (a) When he joins the clips together, David uses the *timeline* and *transition* features.
- (i) Explain why the timeline feature will be useful for David when he is producing the single continuous clip. **1**
- (ii) Name **one** transition David could use. **1**
- (b) One of David's video clips plays for 4 minutes. David recorded the clip using 24 bit colour with a resolution of 720,000 pixels per frame at 15 frames per second. Calculate the file size of the uncompressed video. Show all working and express your answer in appropriate units. **3**
- (c) David stores some video clips in the MPEG file format. Describe how MPEG achieves compression. **3**
- (d) David stores other video clips in the AVI file format. Unlike MPEG, AVI does not allow compression. State **two** reasons why the AVI format might still be a suitable file format for some video clips. **2**
- (e) David has old analogue video recordings that he is transferring onto his computer. Describe the roles of the ADC and DSP on the video capture card during the transfer. **2**

SECTION III

PART C — Multimedia Technology (continued)

28. Super Tutorials create multimedia lessons.

- (a) All the lessons begin with the Super Tutorials theme tune. The tune plays for 1 minute and was recorded in 32 bit stereo using a sampling frequency of 44.1 kilohertz. Ignoring compression, calculate the file size for the theme tune. Express your answer in appropriate units and show all working. 3

The multimedia lessons include text, video and a voice track.

- (b) Lesson voice tracks are initially stored using the RAW file format. State the name of the **technique** used to convert the analogue signal into a digital form. 1

- (c) The completed lessons, which include video and voiceover sound files, are usually distributed in the RIFF file format.

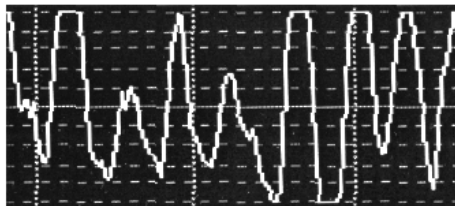
(i) The RIFF file format is an example of a *container file*. Explain the term “container file”. 2

(ii) Explain the benefit of using container files in the distribution of multimedia files. 2

- (d) During testing some problems were found with the voice tracks. It was noted that some voice tracks were too loud but others were too quiet.

(i) Name and describe the function of sound editing software which could be used to make the voice tracks play at the same volume. 2

One voice track file also contained some unclear words. The waveform for part of this file shows the problem.



(ii) State the term for this problem. 1

(iii) The problem identified in Question (d)(ii) may have been caused by recording at too high a volume setting. State **one** other possible reason for this problem. 1

[Turn over for Question 28 (continued) on Page twenty-two]

SECTION III

PART C — Multimedia Technology (continued)

28. (continued)

(e) Super Tutorials also supplies lessons on DVD. It has been suggested to Super Tutorials that *holographic* disks may replace DVDs in the future.

(i) Describe how the physical storage of data on a holographic disk differs from a DVD. 2

(ii) Holographic disks allow faster data transfer than DVDs. Explain **why** this is the case. 2

(50)

[END OF SECTION III—PART C]

[END OF QUESTION PAPER]

X206/12/01

NATIONAL
QUALIFICATIONS
2012

THURSDAY, 31 MAY
9.00 AM – 11.30 AM

COMPUTING
HIGHER

Attempt **all** questions in Section I.

Attempt **all** questions in Section II.

Attempt **one** sub-section of Section III.

Part A	Artificial Intelligence	Page 12	Questions 23 to 27
Part B	Computer Networking	Page 18	Questions 28 to 31
Part C	Multimedia Technology	Page 22	Questions 32 to 35

For the sub-section chosen, attempt **all** questions.

Read all questions carefully.

Do not write on the question paper.

Write as neatly as possible.



SECTION III

Marks

PART C — Multimedia Technology

Attempt all questions.

32. Peter is a guitar teacher who uses his website to give pupils access to audio files. The audio files are instrumental tracks for practice between lessons.

(a) (i) The audio files are stored in the *MIDI* format. One benefit of this file format is its small size. State **two** other benefits of using the MIDI file format. 2

(ii) MIDI files are stored using *sound attributes* such as *duration* and *tempo*. Describe the terms “duration” and “tempo”. 2

(b) State **two** reasons why the pupils may prefer the *MP3* file format to the MIDI file format. 2

Peter has demonstration video clips on his website.

(c) The video clips were originally taken using a resolution of 1024×768 with a frame rate of 25 fps. Calculate the file size of an uncompressed 24 bit video clip which plays for 64 seconds. Show all working. State your answer in megabytes. 3

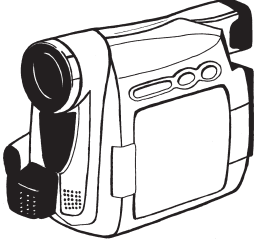
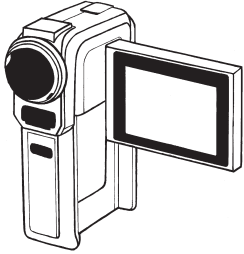
Pupils must *stream* the video clips to their computer when viewing.

(d) Peter is worried about breach of copyright. Explain how **streaming** will help avoid this. 1

(e) Assuming there are no hardware or software problems, explain why streamed video may pause when viewed on a pupil’s computer. 2

PART C — Multimedia Technology (continued)

33. EasyVid manufactures video cameras. The EasyVid Super4 digital video camera will be a new digital video camera designed to replace the current EasyVid Power3 digital camera.

	<p style="text-align: center;">EasyVid Power3</p> <p>4.1 megapixels Bluetooth & Firewire enabled 40 Gb hard disk Video editing software supplied</p>
	<p style="text-align: center;">EasyVid Super4</p> <p>12 megapixels Bluetooth & USB 3.0 enabled Built-in hardware codecs Built-in 3 in 1 card reader Video editing software supplied</p>

- (a) State **two** advantages USB 3.0 has over Firewire. 2
- (b) It had been suggested that the EasyVid Super4 should be WiFi enabled. The manufacturer decides **not** to add a WiFi interface. State **one** reason other than cost to support their decision. 1
- (c) The EasyVid Super4 has no hard disk. Explain why using removable solid state storage would extend battery life. 2
- (d) The manufacturer has built in hardware *codecs* to the EasyVid Super4. Describe **one** advantage and **one** disadvantage to the user of a hardware codec rather than a software codec. 2
- (e) Video editing software is provided with both cameras. This includes *transition features*.
- (i) Explain what is meant by a “transition feature”. 1
- (ii) Name and describe **one** effect usually available as a transition. 2
- (f) Explain why neither camera uses an *ADC* during data transfer to a computer. 1

[Turn over

PART C — Multimedia Technology (continued)

34. The Bestview Camera Club has an annual photographic competition. Presentation software is used to display the entries as a slide show.

- (a) A design technique suitable for planning the presentation is storyboarding. Describe **two** features of a storyboard that should be included in the design of the presentation. 2

Spoken comments about entries are to be recorded for inclusion in the slide show.

- (b) Calculate the **uncompressed** file size of an 8 bit, 24 second stereo recording sampled at 11 kHz. Show all working. State your answer in appropriate units. 3

The WAV file format is used to store the spoken comments. WAV files are compressed.

- (c) (i) State the name of the compression method used. 1
 (ii) Describe **how** this method achieves compression. 2
- (d) Describe how the file size of a spoken comment could be significantly reduced without changing the sampling depth. 1

A short musical introduction is used at the start of the slide show. Figure 1 shows the waveform of the introduction. Figure 2 shows the waveform after an effect has been applied.

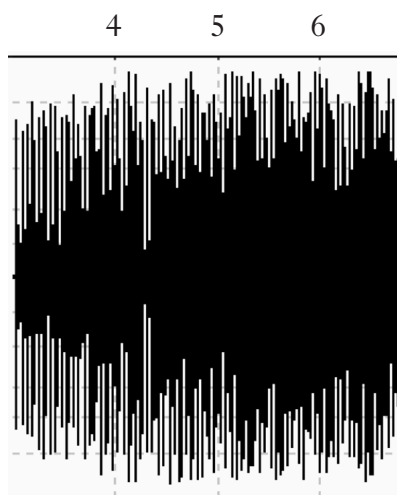


Figure 1

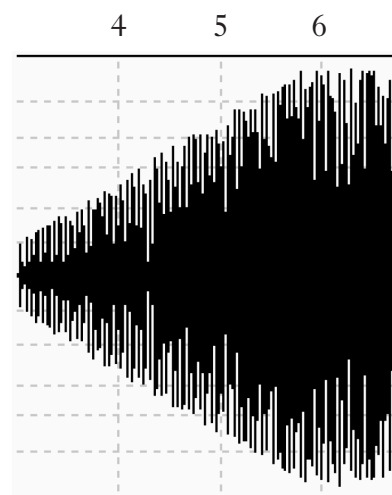


Figure 2

- (e) State the effect applied to the sound. 1

SECTION III

Marks

PART C — Multimedia Technology (continued)

34. (continued)

(f) During testing of the slide show, it is noted that one audio file has been *clipped*.

- (i) Explain the term “clipping”. You **must** include a diagram in your explanation. 2
- (ii) Describe how *normalisation* would have avoided the problem of clipping. 2
- (iii) Describe **one** disadvantage of normalisation. 2

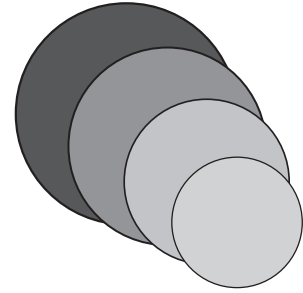
[Turn over for Question 35 on *Page twenty-six*

SECTION III

Marks

PART C — Multimedia Technology (continued)

35. A designer has stored a graphic in each of *GIF*, *PNG* and *SVG* formats.



- (a) The designer notices that adding each circle to the graphic increases the file size of the SVG file but **not** the GIF or PNG files. Explain why the SVG file size increases. 2
 - (b) The finished graphic will be displayed on a variety of screen sizes. Explain why SVG might be the **best** format to choose in this situation. 2
 - (c) Part of the code for the smallest circle is changed from **rgb(0,78,0)** to **rgb(0,16,0)**. Describe the effect of this change on the circle. 2
 - (d) Dithering can be used with the GIF file format but is unnecessary with PNG.
 - (i) Explain the term *dithering*. 1
 - (ii) Explain why dithering is not required for the PNG file format. 2
 - (e) The graphics software used by the designer includes *anti-aliasing*.
 - (i) State the purpose of anti-aliasing. 1
 - (ii) Describe a situation when anti-aliasing might have to be used. 1
- (50)**

[END OF SECTION III—PART C]

[END OF QUESTION PAPER]

X206/12/01

NATIONAL
QUALIFICATIONS
2013

TUESDAY, 28 MAY
9.00 AM – 11.30 AM

COMPUTING
HIGHER

Attempt **all** questions in Section I.

Attempt **all** questions in Section II.

Attempt **one** sub-section of Section III.

Part A	Artificial Intelligence	Page 12	Questions 23 to 28
Part B	Computer Networking	Page 18	Questions 29 to 31
Part C	Multimedia Technology	Page 24	Questions 32 to 35

For the sub-section chosen, attempt **all** questions.

Read all questions carefully.

Do not write on the question paper.

Write as neatly as possible.



PART C — Multimedia Technology

Attempt all questions.

32. A task to create an interactive presentation is given as part of a multimedia course.

Multimedia Course Task

- Create an interactive presentation to guide new students around the college.
- Your presentation must include the sound files and video clips provided.
- The completed presentation must be submitted as a single file.

- (a) (i) Name **one** technique that could be used to design the presentation. 1
- (ii) State **one** feature or item that should be included in the design. 1
- (b) WYSIWYG allows students to see what their slides look like as they are created. State **one** other benefit of using WYSIWYG during the creation of slides. 1
- (c) The presentation will make use of a computer's graphics and sound cards. Graphics and sound cards have a *Digital Signal Processor (DSP)*. State **two** purposes of a DSP. 2
- (d) Several of the sound files provided are in the *MIDI file format*. A student decides to edit the attributes of a MIDI file.
- (i) Describe the effect on a note of increasing the value of the *duration* attribute. 1
- (ii) Describe the effect on a sound of increasing the value of the *tempo* attribute. 1
- (e) One of the sound files has two channels but one channel is much louder and is drowning out the other. Name a **technique** that could be used to correct this problem. 1
- (f) Name and describe **one** method which students could use to submit their completed presentation as a **single** file. 2

PART C — Multimedia Technology (continued)

33. A new logo has been designed for the Summit Walking Club. The logo has been stored in *SVG*, *JPEG* and *GIF* file formats.



- (a) Explain why **SVG** is a suitable file format for this logo. 2
- (b) The **GIF** and **JPEG** versions of the logo are placed onto a photograph to produce the images below.

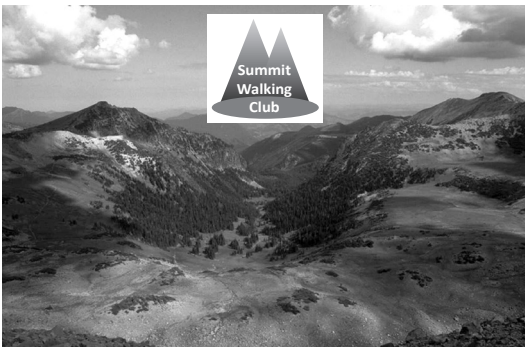


Image A

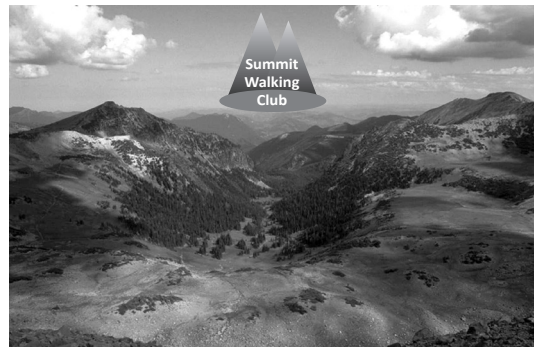


Image B

State which image uses the **GIF** version. State **one** reason for your answer. 2

- (c) *Interlacing* is supported by the *GIF* file format. Explain the effect of interlacing when an image is displayed on a web page. 2

[Turn over

PART C — Multimedia Technology (continued)

33. (continued)

(d) Image C shows an enlarged area of the GIF logo and the effect of *dithering*.

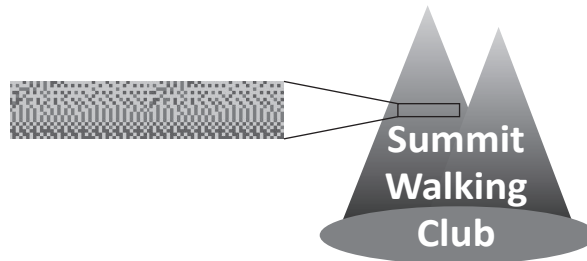


Image C

- (i) Explain the technique of dithering. 2
- (ii) State why dithering is often used with the GIF file format. 1
- (e) The GIF file format stores a *CLUT* along with the image.
- (i) State the purpose of a *CLUT*. 1
- (ii) Describe **one** benefit given by the use of a *CLUT*. 1
- (f) Both the JPEG and GIF file formats feature *compression*.
- (i) The JPEG file format uses the *RLE* technique. Describe the *RLE* technique. 2
- (ii) The GIF file format used the *LZW* technique. Describe the *LZW* technique. 2
- (g) One colour used in the logo can be represented using the *RGB* colour code **(80, 80, 80)**.
- (i) Explain how an *RGB* colour code represents a colour. 1
- (ii) Describe the effect of editing the code to **(80, 80, 190)**. 1
- (iii) Each part of the *RGB* code is represented as an 8 bit binary number. State the number of different colours which can be represented in *RGB* code. 1

PART C — Multimedia Technology (continued)

34. Jakub plays in a band. The band often uses a digital sound recorder during rehearsals.
- (a) The uncompressed file size of a 24 bit stereo recording sampled at 88.2 KHz is 60 Mb. Calculate the time that the file plays for. Show all working. State your answer to the nearest second. 3
 - (b) State **one** benefit of the digital sound recorder having a *memory card reader* rather than internal *solid state storage*. 1
 - (c) Explain why the digital sound recorder requires an *ADC*. 2
 - (d) The digital sound recorder can store files in either *WAV* or *MP3* file format. Explain why the band may prefer to listen to recorded sound stored in the *WAV* file format rather than *MP3* file format. 2
 - (e) Jakub has a *surround sound* system at home. Explain why Jakub may notice little difference between recordings played on his surround sound system and other stereo systems. 2
 - (f)
 - (i) Jakub usually uses *WiFi* to transfer a video clip from his phone to the drummer's phone. State **two** reasons why Jakub uses *WiFi* for this transfer. 2
 - (ii) While rehearsing in a games hall, Jakub has no *WiFi* access. State **one other** wireless standard that Jakub could use. Justify your choice. 2
 - (g) Jakub has a video clip taken using his phone. The 60 second video was recorded at 15 fps using a bit depth of 16 bits and a resolution of 640×360 . Calculate the uncompressed file size for this video clip to the nearest megabyte. Show all working. 3

[Turn over

SECTION III

Marks

PART C — Multimedia Technology (continued)

35. Ms Masters is teaching her class about using *vector file formats* to store graphics. She tells the class “Vector graphic file formats are more storage efficient than bit-mapped file formats”.

(a) Describe the type of graphic Ms Masters might use to show that the statement above is true. 1

(b) Describe what happens to a vector graphic in order for it to be displayed on a monitor. 1

The class are instructed to draw a *3D* object, apply a *texture* and store it in a vector graphic file format.

(c) Explain the term “texture” when applied to a **3D** object. 1

(d) Name **one** possible *attribute* required to store a 3D object **in addition** to those attributes required to store a 2D object. 1

(e) Name a file format suitable for storing a 3D vector graphic image. 1

(50)

[END OF SECTION III—PART C]

[END OF QUESTION PAPER]

ACKNOWLEDGEMENTS

Section III Part B Question 31(e)—Internet Explorer and Bing icons. Permission is being sought from Microsoft.

X206/12/01

NATIONAL
QUALIFICATIONS
2014

FRIDAY, 23 MAY
9.00 AM – 11.30 AM

COMPUTING
HIGHER

Attempt **all** questions in Section I.

Attempt **all** questions in Section II.

Attempt **one** sub-section of Section III.

Part A	Artificial Intelligence	Page 12	Questions 24 to 27
Part B	Computer Networking	Page 19	Questions 28 to 30
Part C	Multimedia Technology	Page 25	Questions 31 to 34

For the sub-section chosen, attempt **all** questions.

Read all questions carefully.

Do not write on the question paper.

Write as neatly as possible.



PART C — Multimedia Technology

Attempt all questions.

31. Pupils from a school ICT club have created a website.
- (a) The pupils used *authoring software* with a *WYSIWYG* editor and text editor to create the web pages.
- (i) State **one** benefit, other than faster creation, for the pupils in using the WYSIWYG authoring software features. 1
- (ii) State **one** advantage for the pupils in using the text editor to create a web page. 1
- (b) Some web pages display differently depending on the browser used.
- State the type of maintenance required to try to correct the differences. 1
- Many web pages in the website contain video clips. Some video clips are *streamed* while others are *embedded*.
- (c) Explain **one** advantage of streaming files rather than embedding files. 2
- (d) Explain **one** advantage of embedding data when playing video clips. 2
- (e) One of the video clips plays for 32 seconds and was recorded at 25 fps. Each frame has a resolution of 1280 x 720 and a colour depth of 24 bits. Calculate the storage requirement for this uncompressed video clip. Write your answer in Gigabytes. Show all working. 3
- (f) Many video clips are stored in the MPEG file format.
- Describe how MPEG achieves compression of the video clip. 2
- (g) Some of the web pages have links to *synthesised* sound files.
- (i) State the most common file type used to store synthesised sounds. 1
- (ii) Explain why synthesised sounds stored in this file format may play differently when played on different computers. 2

[Turn over

PART C — Multimedia Technology (continued)

32. Helen regularly uses slide shows to present her work. She wants to personalise her slide shows by displaying some text in her handwriting rather than a standard font. Helen uses a scanner to input a handwritten copy of her name. The edges on the first scan look jagged.

A large, handwritten word 'Helen' in black ink on a white background. The edges of the letters are noticeably jagged and irregular, characteristic of a low-resolution scan of a handwritten document.

- (a) Explain how altering the scanner settings could make the edges of the image smoother. 2
- (b) Name **one** software technique Helen could also use to try to correct the jagged edges and describe how this technique achieves a smoother image. 2
- (c) Helen stores the scanned image in the JPEG file format and inserts the image on a slide.
- (i) Explain why saving the image as a JPEG has resulted in the image being surrounded by a white box as shown.



- (ii) Name a file format Helen could use to store her scanned image to remove this problem. 1

PART C — Multimedia Technology (continued)

32. (continued)

(d) Helen would like to animate her image.

Name a file format suitable for storing animated graphics.

1

(e) Helen uses her digital camera to take photographs for inclusion in her presentations.

Digital cameras and scanners both use CCDs to capture images.

Explain the difference in how the CCDs in a digital camera and a scanner are arranged.

2

(f) Helen considers creating a font based on her handwriting. Fonts can be stored using a *vector graphic* or *bitmapped* file format.

(i) Explain why a vector file format might be preferred to a bitmapped file format when storing a font.

2

(ii) Explain **one** reason why some fonts might be stored in bitmapped file format.

1

[Turn over

PART C — Multimedia Technology (continued)

33. Image A was stored as a 2D vector graphic. It was then altered to be in 3D.

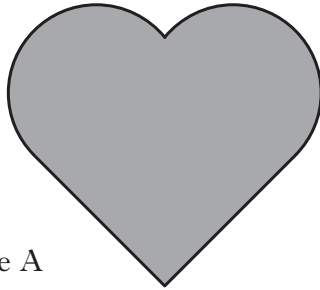


Image A

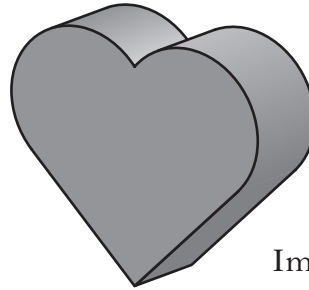


Image B

- (a) Name **two** additional attributes that are required to be able to create the 3D representation shown in image B. 2
- (b) Name a suitable file format for the 3D image. 1
- (c) 3D imaging has become more popular in recent years.
State **two** hardware developments, other than increased storage capacity, which have contributed to this. 2
- (d) Research into holographic storage has continued due to the demand for increased storage capacity in small devices.
State how holographic storage would achieve increased storage capacity. 1

SECTION III

Marks

PART C — Multimedia Technology (continued)

34. AQSound is a business which creates sounds for games software.
- (a) Calculate the storage required for an uncompressed 12 second sound which has been created by AQSound at a frequency of 48 kilohertz with a sampling depth of 2 bytes and 6 channels.
Write your answer in megabytes. Show all working. 3
- (b) State the feature of a sound card required to play this sound effect properly. 1
- (c) Explain why the use of 6 channels allows more realism than stereo. Your answer should include an example. 2
- (d) Many of the sounds are created by AQSound with a *bit rate* of 320 kilobits per second.
Explain the term bit rate. 1
- (e) AQSound do not usually normalise sound files used in a game.
- (i) Describe **one** purpose of normalising sound files. 1
- (ii) Describe **one** limitation of normalising sound files. 1
- (f) AQSound often use a container file to store sound files for games.
- (i) Describe **one** benefit of storing the sound files in a container file. 1
- (ii) Describe **one** possible issue with storing the sound files in a container file. 1
- (g) Sound cards include a DAC and a DSP.
- (i) The DAC converts digital data into analogue data. Explain why a sound card has a DAC. 1
- (ii) The DSP compresses and decompresses sound files. Describe **two** other tasks performed by the DSP. 2
- (h) WAV and MP3 are compressed sound file formats.
- (i) Explain how ADPCM achieves compression in the WAV file format. Your explanation should include an appropriate level of technical detail. 2
- (ii) One technique used in the MP3 format is to remove sounds outside the hearing range of humans.
State **one** other way in which MP3 file sizes are reduced. 1

(50)

[END OF SECTION III—PART C]

[END OF QUESTION PAPER]