

X206/201

NATIONAL
QUALIFICATIONS
2008

MONDAY, 2 JUNE
9.00 AM – 10.30 AM

COMPUTING
INTERMEDIATE 2

Attempt Section I and Section II and **one** Part of Section III.

Section I – Attempt all questions.

Section II – Attempt all questions.

Section III– This section has three parts:

Part A – Artificial Intelligence

Part B – Computer Networking

Part C – Multimedia Technology

Choose **one** part and answer **all** of the questions in that part.

Read each question carefully.

Write your answers in the answer book provided. **Do not** write on the question paper.

Write as neatly as possible.

Answer in sentences wherever possible.



SECTION I

Marks

Attempt ALL questions in this section.

1. State **two** advantages of using binary numbers rather than decimal numbers in a computer system. (2)
2. State **one** function of a *server* on a network. (1)
3. A printer is connected to a computer using an *interface*. Describe **one** function of an “interface”. (1)
4. Describe **one** use of an LCD panel on a printer. (1)
5. Describe **one** benefit of using a mailing list when contacting a large number of people by e-mail. (1)
6. Sunita can store 75 photographs on a 256 Mb memory card in her digital camera. She alters the settings and can now store 101 photographs on the same memory card. Describe the alteration she has made to the settings. (1)
7. Name the stages labelled **X** and **Y** which are missing from the software development process listed below:
 X
 Design
 Y
 Testing
 Documentation
 Evaluation
 Maintenance. (2)
8. A teacher evaluates new software and decides it carries out the tasks she wants but the menus and screen layout could be better.
 - (a) Which **one** of the following has she **not** evaluated:
 - fitness for purpose
 - readability
 - user interface? 1
 - (b) Each morning the teacher has to go through a number of steps on the computer to print a list of absent pupils in alphabetical order. Describe what she could do, so that this can be done efficiently in one step. 1

(2)

9. A travel agent wants a program to store an alphabetical list of winter holiday destinations. State the most efficient way to store lists using a programming language. (1)

10. A conditional statement is used in a program to decide if a discount is given to customers buying theatre tickets.

```
IF day is Monday OR ( age>60 AND day is NOT Saturday) then
    Discount given
ELSE
    No discount
End if
```

What are the expected results for the following sets of test data?

- (a) age = 58, day = Monday 1
 - (b) age = 65, day = Saturday 1
- (2)

11. State **one** use for an embedded computer in the home. (1)

(15)

[END OF SECTION I]

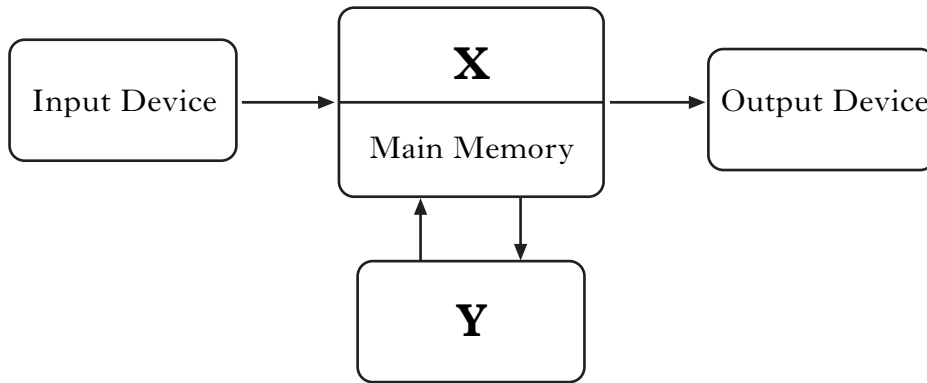
[Turn over for Section II

SECTION II

Marks

Attempt ALL questions in this section.

12. Azam draws the diagram below to represent a computer system.



- (a) The part labelled **X** contains the *Arithmetic and Logic Unit*, the *Control Unit* and the *Registers*. Name part **X**. 1
- (b) Name the part labelled **Y**. 1
- (c) Azam visits his local computer shop and notes down the specification of a laptop computer as shown below.

- | |
|---|
| <ul style="list-style-type: none"> • 2.83 GHz • 1 Gb RAM • 512 Mb ROM • 80 Gb hard drive • CD-RW drive |
|---|



- (i) What is the *clock speed* of the laptop? 1
- (ii) Describe **two** differences, other than cost, between a CD-R disk and a hard disk. 2
- (iii) Azam looks at a website that advertises laptops. When he clicks on the words “Laptop Guide” another Web page opens with tips for buying laptops. Explain why this happens. 1
- (iv) Name a suitable input device that Azam should buy so that he can use his laptop for video conferencing. 1
- (d) Azam designs a program that uses the formula below to convert terabytes to kilobytes.

$\text{kilobytes} = \text{terabytes multiplied by } 2^{30}$

- Using a high level language with which you are familiar, write the line of **code** for the formula shown above. 2
- (e) Azam writes a program in a high level language and it is translated using a compiler. After successfully running the program a few times, he decides to make some changes to it.

Explain why Azam will find it difficult to edit the compiled program. 1

13. Roseanne owns a Garden Centre. She has developed a program that asks the user to enter the name and the price of a plant. The program then calculates and displays a table of prices as shown below.

Plant: Geranium	
Number	Cost (£)
1	1.50
2	3.00
3	4.50
4	6.00
5	7.50

The design for the program is shown below with step 4 blank:

1	get name and price of plant
2	display the name of plant
3	display the words "Number" and "Cost (£)"
4	
5	display number, number times price
6	end loop

- (a) What should step 4 of the design be? 2
- (b) What type of variable should be used to store the name of the plant? 1
- (c) Pseudocode has been used to represent the design. Name **one** graphical design notation. 1
- (d) After using the program for several months, Roseanne decides to improve the program by adding a new feature.
- Name the stage of the software development process which is being carried out when Roseanne changes her program. 1
- (e) Roseanne wants the program to check that the price entered in pounds is more than 1 but less than 4. Roseanne refines step 1 as follows:

1.1	ask for name of plant
1.2	repeat
1.3	ask for price of plant
1.4	if price ≤ 1 OR price ≥ 4 then
1.5	display error message
1.6	end if
1.7	until _____

- (i) Name the standard algorithm being used to check the price. 1
- (ii) Write the condition needed to complete step 1.7 2
- (iii) Once Roseanne has coded the algorithm she tests it with the price £6. Explain why Roseanne used this test data. 1

13. (continued)

- (f) Roseanne uses a database to store details of books stocked by the Garden Centre. She uses the database to produce lists of books on special offer.

List A

Title	Price
Bulbs for Spring	£8
Green Lawns	£5
Orchids	£9
Bonsai for Beginners	£3

List B

Title	Price
Orchids	£9
Bulbs for Spring	£8
Green Lawns	£5
Bonsai for Beginners	£3

Identify **one object** and **one operation** that was carried out on that object to change List A into List B.

2

(11)

14. Harry buys anti-virus software on the Internet. He downloads the software and he also downloads a *user guide* and a *technical guide* for the software.
- (a) Name the stage of the software development process at which a “user guide” and a “technical guide” are produced. 1
- (b) The format of the files for both guides is *rich text*. Explain why “rich text” is used in this situation. 1
- (c) State the type of network to which Harry’s computer is connected when he is downloading the software. 1
- (d) Harry cannot remember where he saved the file for the user guide. He uses a program which asks him to enter the name of the file and then it finds the file for him.
- Which of the following standard algorithms does the program use to find the file:
- Input validation
 - Linear search
 - Find maximum
 - Find minimum
 - Count occurrences? 1
- (e) Once installed on Harry’s computer the anti-virus icon appears on the desktop as a black and white bitmapped graphic. The graphic is 20 pixels by 64 pixels.
Calculate the storage requirements of the icon in bytes.
Show all working. 2
- (f) When Harry runs the anti-virus software it detects a virus in the *operating system*.
- (i) State **one** way in which his computer could have been infected by this virus. 1
- (ii) What is the purpose of an “operating system”? 1
- (g) Harry gives a copy of the anti-virus software to his brother. Name the law which Harry may have broken. 1
- (9)**

[END OF SECTION II]

[Turn over for Section III

SECTION III

Attempt ONE part of Section III

Part A	Artificial Intelligence	Page 9	Questions 15 to 18
Part B	Computer Networking	Page 12	Questions 19 to 21
Part C	Multimedia Technology	Page 15	Questions 22 to 24

Choose **one** part and answer **all** of the questions in that part.

SECTION III

Part A—Artificial Intelligence

Marks

Attempt ALL questions in this section.

15. Newtown Hospital uses *artificial intelligence* applications for some tasks. One example is MedicTalk language processing software. This is installed on the doctors' computers to help communication with foreign patients. The doctor speaks a sentence in English, selects the required language and MedicTalk repeats it in that language.
- (a) Describe **one** aspect of human intelligence, other than the ability to communicate. 1
- (b) Eliza is an early example of language processing which imitates a conversation with a psychologist.
- (i) Describe **one** reason why it could be argued that Eliza **does not** show intelligence. 1
- (ii) Name the test that can be used to decide if a program is intelligent. 1
- (iii) MedicTalk has a much larger vocabulary than Eliza. Describe **one** hardware development that made this improvement possible. 1
- (iv) MedicTalk uses *speech recognition*. State **one** factor that could affect the accuracy of the “speech recognition”. 1
- (c) RoboCarrier is an intelligent robot used to deliver medical records within the hospital. If it meets an obstacle it stops and asks the object to move.
- (i) State how RoboCarrier could detect an obstacle in its path. 1
- (ii) As an intelligent robot, describe what RoboCarrier should do if the obstacle does not move. 1
- (7)**

[Turn over

16. Mr MacDonald is a fruit farmer who is using *artificial intelligence* to improve his crop production. He uses an *expert system* to select the best method of pest control.

- (a) Explain what is meant by an “expert system”. 1
- (b) State **one** advantage of using an “expert system” rather than a human expert. 1
- (c) A *vision system* is used to grade apples as perfect or damaged based on their appearance.
Describe how a “vision system” could be used to grade the apples. 2
- (d) Mr MacDonald needs a loan from his bank. The bank uses an *artificial neural system* to assess the risk in giving a loan to Mr MacDonald.
- (i) Explain what is meant by an “artificial neural system”. 1
- (ii) Describe **one** disadvantage of relying on an “artificial neural system”. 1
- (e) Mr MacDonald is using the World Wide Web to find dates and locations of Farmers’ Markets in Scotland. Describe how he should use the search engine below to obtain this information.

keywords

2
(8)

17. A travel agent requires a knowledge base about the cost of excursions. A software developer working on this project is creating a *semantic net*.

- (a) Name the stage of the software development process which is being carried out. 1
- (b) Draw a semantic net to represent the facts below:
 Venice is a full day trip
 Florence is a full day trip
 The price of a full day trip is £32 2
- (3)

18. The solar ultraviolet index (UV index) can be used as a guide to the risk of skin damage from the sun. The knowledge base below shows facts about a UV index forecast for British towns and rules about the level of risk of skin damage.

- 1 uv_index(blackpool, 2).
- 2 uv_index(london, 5).
- 3 uv_index(edinburgh, 3).
- 4 uv_index(inverness, 4).
- 5 uv_index(oban, 5).

- 6 high_risk(X) if uv_index(X,Y) and Y>4.
- 7 medium_risk(X) if uv_index(X,Y) and Y=4.
- 8 medium_risk(X) if uv_index(X,Y) and Y=3.

- (a) What would be the result of the following query:
? uv_index(london, 5). 1
- (b) What would be the **first** solution to:
? medium_risk(X). 1
- (c) Using the numbering system to help you, trace how the system evaluates the query:
? high_risk(oban). 3
- (d) A UV index below 3 is regarded as low risk.
Use this information to complete the following rule:
low_risk(X) 2
- (7)**

[END OF SECTION III—PART A—ARTIFICIAL INTELLIGENCE]

SECTION III

Part B—Computer Networking

Marks

Attempt ALL questions in this section.

19. Emiko has purchased a laptop computer.

(a) When Emiko switches on her laptop, it asks if she wants to connect to a wireless LAN (WLAN). Emiko does not have a WLAN but her neighbour does.

(i) Name the type of transmission that her neighbour’s network is using. 1

(ii) Emiko tries to connect to the WLAN. Which part of her neighbour’s wireless network hardware is Emiko communicating with? 1

(iii) Emiko was unable to connect to her neighbour’s WLAN because of *software security*.

Describe **one** method of implementing “software security”. 1

(b) Emiko e-mails her friends once a week. She writes her e-mails off-line then connects to the Internet and sends her e-mails.

(i) Explain why Emiko writes her e-mails off-line. 1

(ii) Name the type of Internet connection Emiko is most likely to have. 1

(c) Emiko uses a computer at work to send the following e-mail to one of her friends.

To:	charlesyounger@xyz.org
From:	emiko@warmmail.com
Subject:	Video Clip
File(s)	Slipping on a banana.mpg (300Mb)

Hi,
Not sure if you will be interested in this video clip but I thought it was quite funny.
Emiko

(i) Describe how sending this e-mail may have broken the code of conduct concerning the use of Networks and the Internet at her workplace. 1

(ii) By looking at Charles Younger’s e-mail address, suggest the type of organisation that he works for. 1

(iii) Name the term used to describe a file that is included as part of an e-mail. 1

(8)

20. Rachel is a mother of two young children. She works from her home in Livingston and uses the Internet for both business and pleasure. Her two children also use the computer for Internet access.

(a) Rachel and her children use a search engine to find information.

The image shows a search engine interface. On the left, the word 'keywords' is followed by a rectangular text input field. To the right of the input field is a button with the word 'Search' written on it.

- (i) Describe how Rachel would use the search engine to get information on tennis clubs in Livingston. 2
- (ii) Sometimes when the children are using the search engine they get the message “content blocked”.
Describe **one** reason why this message appeared. 1
- (iii) Rachel contacts her ISP to find out why some searches have been blocked. What do the letters ISP stand for? 1
- (b) Rachel has written an *encryption* computer program which she is going to sell from her website.
- (i) Describe the purpose of an “encryption” program. 1
- (ii) The Government has told Rachel that she must give them a copy of the key to her encryption program.
Name the law which states that Rachel should give them a copy of the key. 1
- (iii) Describe **one** economic implication of deciding to sell the program using her website rather than from a shop. 1
- (c) One customer has contacted Rachel and asked if he could have a *user guide* for the encryption program. Rachel replied that he can download it from:
- <http://www.sekrets.com/encrypt/downloads/manual.dok>
- (i) When the customer enters the URL into his browser, the file is found on the server and downloaded.
Describe how the file is found. 2
- (ii) What is the pathname of the “user guide” in the URL above? 1
- (iii) Describe the purpose of a “user guide”. 1
- (d) Rachel is concerned that she might lose all the information on her computer, so she copies all her files onto a DVD-RW.
Describe **two** further actions that should be part of Rachel’s backup strategy. 2

(13)

21. Horst has recently returned home from hospital where he had a heart monitor fitted. This monitor will measure his heart rate and send the information to his palmtop computer.
- (a) Name the type of communication network described above. **1**
- (b) When the heart monitor is communicating with the palmtop computer, the analogue signal from the monitor must be converted into a digital signal that the computer can understand.
Name the part of the computer that converts the analogue signal into a digital signal. **1**
- (c) If his heart rate gets too high, Horst may need medical treatment.
Describe a suitable use for converging technologies in this situation. **1**
- (d) Horst notices a “signal failure” message on his palmtop.
Name the threat to the network that has occurred. **1**
- (4)**

[END OF SECTION III—PART B—COMPUTER NETWORKING]

SECTION III

Part C—Multimedia Technology

Marks

Attempt ALL questions in this section.

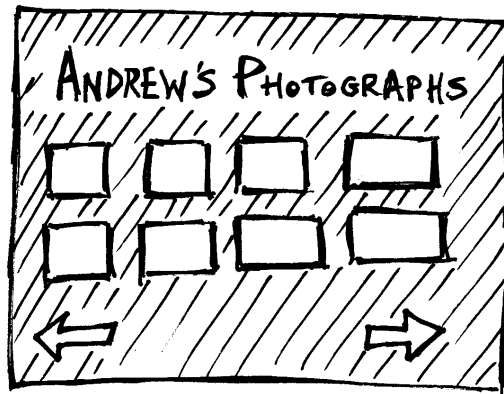
22. Andrew is a photographer who would like to sell his photographs on the World Wide Web.

(a) When Andrew takes a photograph with his digital camera, the light passes through the lens onto the CCD.

Explain the purpose of the CCD in a digital camera.

1

(b) Andrew produces a plan on paper for the Web page that will display his photographs.



(i) Name the stage of the software development process which Andrew is carrying out.

1

(ii) Each photograph takes up 29360128 bits of memory.

Calculate how many megabytes of memory are equal to 29360128 bits. **Show all working.**

2

(c) Andrew could either use a WYSIWYG editor or a text editor to create his Web page.

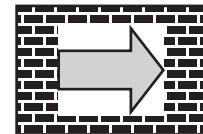
(i) Describe how a WYSIWYG editor would be used to create the Web page.

1

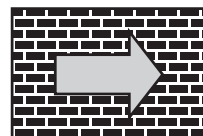
(ii) Describe how a text editor would be used to create the Web page.

1

(d) Andrew adds a button saved in GIF format to the Web page. He finds that an outline of the button appears.



He alters the graphic of the button so that he is able to see through the graphic to the background.



Name the feature of a GIF graphic which allows the background to be seen.

1

(e) Some customers complain that Andrew's Web page is very slow to load over their Internet connection.

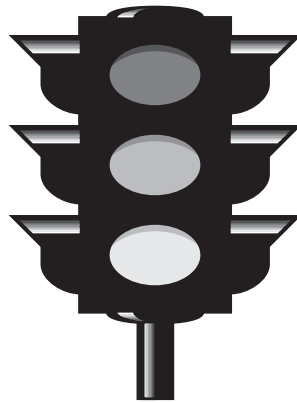
Describe **one** alteration Andrew could make to the photographs that would allow faster loading of the Web page.

1

(8)

23. DigiPhones is developing a video telephone system that allows users to see and hear the person phoning them.
- (a) Apart from a digital video camera, name **one** other piece of multimedia input hardware the video telephone system would require. **1**
- (b) DigiPhones is unsure whether to use *synthesised sound data* or *digitised sound data* when capturing the user's voice.
- (i) Explain why "synthesised sound data" would be unsuitable for this purpose. **1**
- (ii) When digitising sound, one of the factors affecting *sound quality* is the *sampling rate*. Describe the relationship between the "sampling rate" and the "sound quality". **1**
- (c) MP3 files use *lossy compression* to reduce the amount of memory used.
- (i) Describe how "lossy compression" reduces the filesize. **1**
- (ii) Name **one** uncompressed sound file format. **1**
- (d) When testing the video telephone system, several people complained that the *resolution* of the video was poor.
- (i) Describe what is meant by the term "resolution". **1**
- (ii) Apart from altering the "resolution", describe **two** ways in which the video quality could be improved. **2**
- (e) DigiPhones would like to create a new ringtone.
- (i) Describe how DigiPhones could **create** the music for a new ringtone and store it on the computer without using a microphone. **1**
- (ii) The ringtone is tested on the computer and heard through a loudspeaker. Apart from a loudspeaker, what other hardware would be required to output the ringtone? **1**
- (f) Name the correct term used to describe a mobile phone that integrates the functionality of a palmtop computer. **1**
- (11)**

24. The image shown below was created using a graphics package.



- (a) Describe **two** methods you could use to decide if the above graphic was created in a vector graphics package or a bit-mapped graphics package. **2**
- (b) The graphic was saved using the SVG file type.
State what the letters SVG stand for. **1**
- (c) Describe how a vector graphic file stores information about each object in the graphic. **1**
- (d) From the graphic shown above, identify **one** object and **one** operation that may have been carried out on that object. **2**
- (6)**

[END OF SECTION III—PART C—MULTIMEDIA TECHNOLOGY]

[END OF QUESTION PAPER]

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