X206/201

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

Attempt ALL questions in this section.

Marks

1. State **one** benefit of networking computers. **(1)**

2. Explain the difference between storing data in RAM and storing data on backing storage. **(1)**

3. Name the part of the processor responsible for carrying out calculations. **(1)**

4. Name the software that controls the process of saving files to disk. **(1)**

5. Name **one** optical storage medium that allows the user to save files but **not** delete them. **(1)**

6. Name an input device which is built into a palmtop computer. **(1)**

7. Each character on the keyboard has its own ASCII code. The ASCII code for one of the *control characters* is 13.

   (*a*) Convert the decimal number 13 into a binary number. **1**

   (*b*) Describe the function of "control characters". **1**

   (2)

8. Explain the purpose of the *analysis* stage in the software development process. **(1)**

9. State **one** advantage of writing programs in a high level language rather than in machine code. **(1)**

10. Name the stage of the software development process at which the *user interface* is created. **(1)**

11. Complete the following *complex condition* that displays a message "Slow Down" for cars whose speed is over 30, but below 35.

    IF _____THEN display "Slow Down". **(2)**

12. A hospital uses a program to store the length of time each person waits to see a doctor. The program reports the longest waiting time.

State which **one** of the following standard algorithms the program would use:

- Input validation
- Find maximum
- Find minimum
- Count occurrences
- Linear search **(1)**

13. Name the type of loop that a program would use to implement an *input validation* algorithm. **(1)**

(15)

[*END OF SECTION I*]

[Turn over for Section II

Marks

14. Marek is writing a program to calculate the average weekly rainfall.

The design for this program can be represented as follows:

1.	set total to zero
2.	loop 7 times
3.	get day's rainfall from user
4.	add rainfall to total
5.	end loop
6.	calculate average rainfall
7.	display average rainfall

(*a*) (i) Name the design notation that has been used above. **1**

(ii) Name and describe a **graphical** design notation. **2**

(*b*) Steps 2 and 5 are the beginning and the end of a *fixed loop*.

Explain why a "fixed loop" is being used here. **1**

(*c*) Marek uses an *editor* at the implementation stage of the software development process.

(i) State the purpose of an "editor" at the implementation stage. **1**

(ii) State where the program is stored before it is saved to backing storage. **1**

(*d*) Describe **two** methods that Marek could use to ensure that his code is *readable*. **2**

(*e*) The program calculates the average rainfall for one week as 18·6 mm.

Describe how *floating point representation* is used to represent real numbers. **2**

(10)

15. The estate agent PropertyPlus has a catalogue of local properties for sale. A sample page from the catalogue is shown below.

Property 1 of 65

(*a*) From this sample page, identify **one** object and **one** operation that may have been carried out on the object. **2**

(*b*) The image of the house measures 3 inches by 4 inches and has a resolution of 600 dpi.

Calculate the storage requirements for the photograph in **kilobytes**.
Show all working. **3**

(*c*) The photograph was taken using a digital camera. The camera was connected to a computer system through an *interface*.

State **one** function of an "interface". **1**

(*d*) State **one** reason why the estate agent might choose a laser printer rather than an inkjet printer to print the catalogue. **1**

(*e*) PropertyPlus makes its catalogue available on-line.

  (i) Name the type of software that is required to access this catalogue on-line. **1**

  (ii) State an appropriate type of software for protecting a computer system while accessing the Internet. **1**

(*f*) Name the legislation that requires PropertyPlus to protect information held on customers. **1**

(10)

[Turn over

16. Jenna writes a program that will calculate the speed of a car.

The algorithm for the program is shown below.

---

1. Take in distance travelled by car

2. Take in the time taken to travel this distance

3. Calculate the speed of the car

4. Display the speed of the car

(*a*) State **one** appropriate data type for the variables used in the program. **1**

(*b*) The distance travelled by the car must be under 80 km.

  (i) Name the standard algorithm that should be used in this program to ensure that the distance entered is within range. **1**

  (ii) Jenna tests her finished program by using 30 and 40 as examples of *normal* test data for the distance. Suggest **two** numbers that Jenna should use for *exceptional* test data. **2**

(*c*) Jenna used an *interpreter* while developing her program. State **one** advantage of using an interpreter rather than a compiler. **1**

(*d*) The finished program requires 84 Mb of memory.

Name the item of *documentation* that should contain this information. **1**

(*e*) Jenna checks to see if her program is *fit for purpose*.

  (i) Name the stage of the software development process that Jenna is carrying out. **1**

  (ii) State what is meant by the term "fit for purpose". **1**

(*f*) Computer viruses pose a serious threat to computer systems.

  (i) State **one** way of spreading computer viruses. **1**

  (ii) Describe **one** common symptom of a computer virus. **1**

(10)

[*END OF SECTION II*]

SECTION III

Attempt ONE part of Section III

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

[Turn over

SECTION III

Part A—Artificial Intelligence

Attempt ALL questions in this section.

17. (*a*) Early artificial intelligence focused on games like noughts and crosses, draughts and chess.

    (i) State **one** reason why game playing was one of the first areas of artificial intelligence research. **1**

    (ii) Name and describe the test that is used to determine whether a computer shows intelligence. **2**

  (*b*) ELIZA is a program that simulates a conversation.

    (i) Describe how ELIZA responds to input from the user. **1**

    (ii) Name the **type** of program used to hold a conversation with a human. **1**

  (*c*) The Post Office uses an *artificial neural system* in the sorting office.

  Describe a task that an "artificial neural system" is used for in this situation. **1**

  (*d*) Braeness International Airport uses an intelligent robot to carry luggage.

    (i) Describe how the robot could find its way from one location in the airport to another location in the airport. **1**

    (ii) State **one** advantage of using an intelligent robot to carry luggage around the airport rather than using a robot with no intelligence. **1**

  (*e*) State **one** development in computer hardware that has made progress in the field of artificial intelligence possible. **1**

(9)

18. The organisation Health4Scotland has an expert system on its website to help patients plan a programme of exercise and healthy eating.

(*a*) State **two** advantages to the patient of using the expert system rather than visiting the doctor. **2**

(*b*) Suggest **one** concern that doctors might have about the introduction of this expert system. **1**

(*c*) Patients are able to use palmtop computers to input data into the expert system using speech recognition.

   (i) State **one** task the user will need to carry out before the speech recognition software can operate effectively. **1**

  (ii) Name **one** problem that could affect the accuracy of the speech recognition system. **1**

 (iii) Apart from speech recognition, name an application of artificial intelligence that could be used to input the data. **1**

(6)

[Turn over

19. Xtreme Biking is a company that offers mountain biking courses. The knowledge base below holds facts and rules, and is able to match students to courses.

1 fitness(jessica, excellent).

2 fitness(shabir, excellent).

3 fitness(mary, excellent).

4 fitness(dominik, good).

5 fitness(graeme, poor).

6 owns(shabir, bike).

7 owns(graeme, bike).

8 owns(mary, bike).

9 experienced(dominik).

10 attend_intermediate_course(X) if

experienced(X).

11 attend_advanced_course(X) if

fitness(X excellent) and owns(X bike).

(*a*) (i) State the result of the following query:

? fitness(mary, good). **1**

(ii) State the result of the following query:

? attend_intermediate_course(X). **1**

(*b*) Using the numbering system to help you, *trace* how the system will evaluate the query:
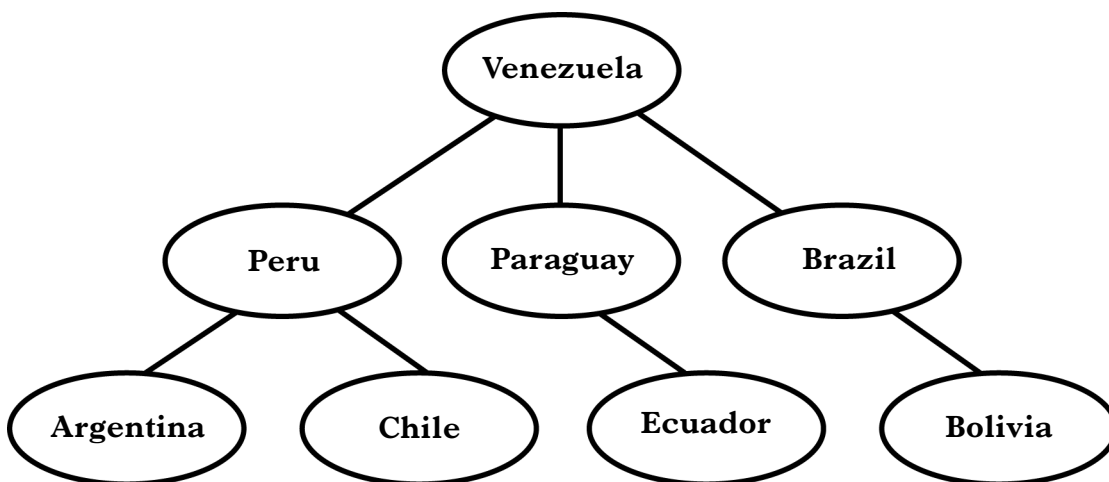
? attend_advanced_course(X).

as far as the first solution. **4**

(6)

20. (*a*) A problem is represented using the search tree below.

The solution to the problem is Chile.

List the nodes, in the order in which they will be visited, to reach the solution using a *breadth-first search*. **1**

(*b*) One way of representing information before creating a knowledge base is by using a *semantic net*.

   (i) Name the stage of the software development process at which a "semantic net" will be drawn. **1**

   (ii) Draw a "semantic net" to illustrate the following information:

   Finland is in Northern Europe and uses the Euro as its currency. **2**
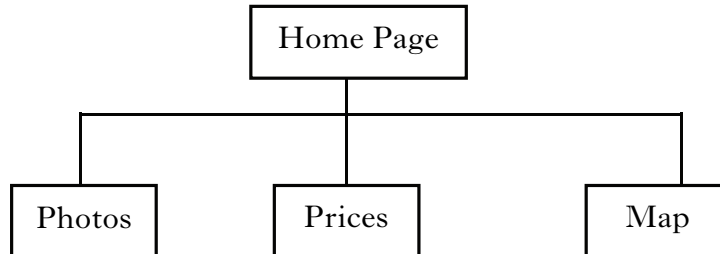
   (4)

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

Marks

21. Simon has a villa which he rents to holidaymakers. He creates a website to advertise the villa. Simon chooses an ISP to host his website.
    The structure of his website is shown below.

```
            ┌─────────────┐
            │  Home Page  │
            └─────────────┘
                   │
      ┌────────────┼────────────┐
┌──────────┐ ┌──────────┐ ┌──────────┐
│  Photos  │ │  Prices  │ │   Map    │
└──────────┘ └──────────┘ └──────────┘
```

   (*a*) State what Simon should have on his home page to help users navigate his website. **1**

   (*b*) Simon uploads his website files to the ISP host computer.

      (i) State what ISP means. **1**

      (ii) Name the Internet service that Simon uses to upload his website files. **1**

      (iii) Name the type of *data transmission* that Simon uses when he uploads his website files to the host computer. **1**

   (*c*) The URL for the Web page which has a map is:

        http://www.isp4scots.co.uk/simonsvilla/map.html

      (i) State the domain name for this Web page. **1**

      (ii) Describe the function of the *Domain Name Service*. **2**

   (*d*) Simon registers details of his website with a search engine company.

   State **one** reason why this will benefit Simon. **1**

   (8)

22. Grange Bank uses the Internet to recruit employees. People seeking employment can fill in application forms and sit selection tests on-line. They are informed by e-mail if they are to be invited to attend for interview.

(*a*) Describe **one** cost to the bank of using the Internet to recruit staff. **1**

(*b*) The bank has a version of their website formatted for mobile phones.

Name the software that will be needed to view a website on a mobile phone. **1**

(*c*) Data submitted to the bank is *encrypted* and stored on disk.

Describe a situation where the bank must allow outside agencies access to "encrypted" data. **1**

(*d*) An employee at a rival bank gains unauthorised access to the bank's computer and deletes some files.

   (i) Name the law that the employee is breaking. **1**

   (ii) Describe **two** features of a *backup strategy* that would allow the bank to recover this data. **2**

(*e*) Yasmina is applying for a job with the bank. She has been on-line all morning completing the application form and sitting on-line tests.

   (i) State **two** reasons why an *ADSL Internet connection* is better than connecting with a *dial-up modem* in this situation. **2**

   (ii) Yasmina receives an e-mail inviting her to attend for interview.

     The e-mail address is:

<p align="center">recruitment@grangebank.com</p>

     State the user name in this e-mail address. **1**

(*f*) Yasmina is successful at her interview and is appointed as a financial adviser who visits customers in their own homes. She will use her laptop and a printer to form a WPAN.

   (i) State what WPAN stands for. **1**

   (ii) Yasmina decides to use her laptop to do some on-line shopping.

     Describe what the bank could do to prevent her accessing on-line shopping websites. **1**

(11)

[Turn over

23. Swirlclean is a company that sells washing machines from its website. Sophie buys a washing machine from the Swirlclean website.

(*a*) Describe **one** advantage to the customers of e-sales. **1**

(*b*) Sophie's washing machine is model WM07. A fault code F31 is displayed on an LCD panel on the front of the washing machine.

   (i) State what LCD stands for. **1**

   (ii) Sophie logs onto the company's website.

     Describe how she could use the screen below to get information about the fault.

```
SWIRLCLEAN QUICKFIX!

MODEL     [                    ]

FAULT CODE  [            ]    →  GO
```

2

(*c*) Sophie phones an engineer who visits her home. He connects his laptop to the washing machine and re-installs the control software.

   (i) Name the type of computer that is built in to the washing machine. **1**

   (ii) Describe **one** way in which *convergent technology* would have been of benefit in this situation. **1**

(6)

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

[Turn over for Section III Part C – Multimedia Technology]

Part C—Multimedia Technology

Marks

Attempt ALL questions in this section.

24. Rowan High School is moving to a new building in 2010. The pupils are creating a DVD that tells the history of the school.

(*a*) Mr Alexander, a previous headteacher, now lives in Canada.

Name the input device that Mr Alexander could use so that a filmed interview with him could be captured across the Internet.

1

(*b*) The pupils use a scanner to capture graphics from old photographs of staff and pupils.

(i) When the photographs are scanned, reflected light is turned into an analogue signal and then digitised.

Name the device in the scanner that does the digitising.

1

(ii) The scanner software asks the user to select the *colour depth* and the *resolution*.

A) Explain what is meant by "colour depth".

1

B) Explain what is meant by "resolution".

1

(iii) One of the photographs is to be altered so that only the head and shoulders show.

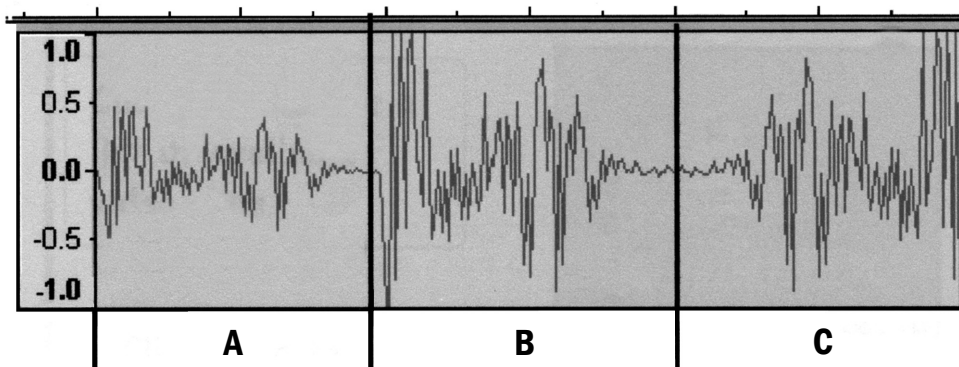Name the image editing tool that could be used to do this.

1

(iv) The scanned photographs are stored as bitmap files rather than JPEG files.

Describe the effect this will have on file size.

1

24. (continued)

(*c*) Background music for the DVD is created from a recording of the school choir. The sound wave is shown below.

(i) Section A was copied and edited to create section B.

Name the editing feature that has been used to create section B. **1**

(ii) Section B was copied and edited to create section C.

Name the editing feature that has been use to create section C. **1**

(iii) Apart from speakers, name the hardware that is needed to output sound. **1**

(*d*) The architects have produced a *virtual reality* guide to the new school building.

(i) Explain why the "virtual reality" application lets pupils experience the new building more fully than a slide show presentation would. **1**

(ii) Name a file type that could be used to store the vector graphics used in the virtual reality guide. **1**

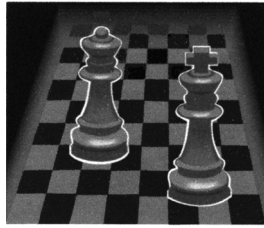(iii) Name **one** type of software the school could use to view a multimedia application. **1**

(12)

[Turn over

25. Martyn produces a website that provides information for visitors to Venice. One page of the website is shown below:
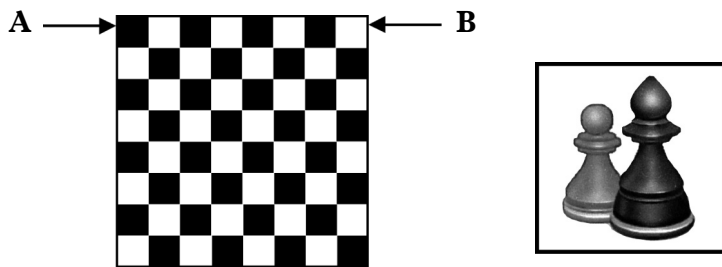

(*a*) When the video clips were first captured they filled the whole screen.

What change has been made to the video clip so that the whole clip can be viewed in the window shown above?   **1**

(*b*) The file size of the video clips is very large. It is reduced by decreasing the frame rate.

   (i) State **one advantage** of decreasing the frame rate rather than decreasing the video time.   **1**

   (ii) State **one disadvantage** of decreasing the frame rate rather than decreasing video time.   **1**

(*c*) Visitors can download an MP3 audio tour guide which they can listen to while exploring Venice.

   (i) Name the type of compression used by MP3.   **1**

   (ii) State **two** reasons why it is important that the audio tour files have a small size.   **2**

(*d*) Martyn is a good keyboard player. He wants to create the sounds of guitars and violins as background music for the video clips.

Name the input device he should use to create the music.   **1**

(*e*) Martyn adds more information to his website after it has been on-line for a few weeks.

Name the stage of the software development process that is being carried out.   **1**
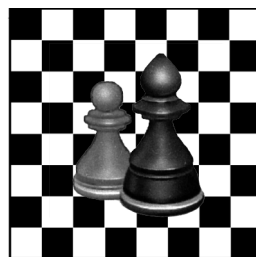
(8)

Marks

26. Krysia has created a chess game using 3D graphics.

(*a*) Name the *attribute* of the image of a chess piece which can be changed so that the chess piece looks like wood. **1**

(*b*) Krysia is creating the CD cover for the chess game. She has used graphics packages to create images of the chessboard and chess pieces as shown below.

(i) Krysia has used a *vector graphics package to* create the chessboard.

State **two** *attributes* that are different between square **A** and square **B** in the graphic above. **2**

(ii) Explain how you could prove that the graphic of the chess pieces has been produced using a *bit mapped graphics package* rather than a *vector graphics package*. **1**

(iii) Krysia wants the chessboard to show through the background in the graphic of the chess pieces as shown below.

State the *attribute* of the graphic of the chess pieces that she should change to do this. **1**

(5)

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

[*END OF QUESTION PAPER*]

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