2013/2014 P&N Test Paper for

| NATIONAL QUALIFICATIONS | TIME ALLOWED: 1 HOUR 30 MINUTES | 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.

P&N
...the right choice

SECTION I

Attempt ALL questions in this section.

Marks

1. Computer viruses are an increasing problem.

   (*a*) Describe how a virus could infect a computer. **1**

   (*b*) State the law that would be broken by a programmer writing and releasing a virus. **1**

2. In a processor the registers are used for temporary storage of data.

   Name the part of the processor which performs arithmetic and logical operations. **1**

3. Computers store data as binary numbers.

   (*a*) Convert the decimal number 42 into binary. **1**

   (*b*) Convert the binary number 10111 into decimal. **1**

4. State the purpose of a *string variable*. **1**

5. During the software development process a *text editor* may be used.

   (*a*) State **one** use of a text editor. **1**

   (*b*) State at what stage of the software development process a text editor would be used. **1**

6. Programmers often use *pre-defined functions* to save time when programming.

   (*a*) State an example of a pre-defined function. **1**

   (*b*) Explain what the function in your example does. **1**

7. State which type of main memory a computer system uses to temporarily store programs or data. **1**

8. State **one** reason an interface is needed between a computer and a scanner. **1**

Marks

9. When using a database, recording your actions and assigning them to a keystroke when sorting or searching can save time when the same process needs to be frequently repeated.

    State the term used to describe this activity. **1**

10. Using a high-level language with which you are familiar, write the code to assign the value "3·141" to the numeric variable `Pi`. **1**

11. A DVD is an example of optical storage media. What type of storage medium is a hard disk? **1**

(15)

[*END OF SECTION I*]

[Turn over for Section II

Marks

SECTION II

Attempt ALL questions in this section.

12. ScotBank have replaced their old *mainframe computer* with a network of PCs.

(*a*) State why ScotBank would have originally chosen a mainframe for its computing needs.   **1**

(*b*) Part of the specifications for the bank's new PCs is shown below.

New PC Specification	
Processor	3·2 Ghz AMI
RAM	6 Gb
Magnetic Drive	1 Tb Hard Drive
Optical Drive	DVD/CD-RW Drive

  (i) State the *clock speed* of this PC.   **1**

  (ii) This PC does not have a floppy disk drive.

Give **one** reason modern PCs do not use floppy disks.   **1**

  (iii) Apart from cost, state **two** differences between a PC's DVD drive and its internal hard disk drive.   **2**

(*c*) State **two** benefits to the bank of networking its branches' computers across the country.   **2**

(*d*) ScotBank frequently transfers large amounts of money. A record is kept of all transactions and totals are reported to management each day. This often requires very large numbers to be stored.

Explain how *floating point representation* is used to store large numbers.   **2**

(*e*) The bank must obey the Data Protection Act.

With regards to databases of customer details, state **one** way in which the bank must comply with this law.   **1**

     (10)

Marks

13. Newton Tennis Club uses a computer program to record players' details along with their match results.

```
Gordon Simpson
Age 18

Results:

Matches Played:-
Wins:
Draws:
Losses:

Average points per game:
Current league position:
```

(*a*) Name the data structure that would be used to store a list of the players' names. **1**

(*b*) State the standard algorithm which would be used to find a player's best score. **1**

(*c*) Gordon is adding to the program to allow it to list entries for the Club Shield tournament. Players must be over sixteen but under sixty-five to enter.

Part of the pseudocode for Gordon's algorithm is as follows:

```
1.1 ask for name
1.2 Repeat
1.3       ask age
1.4       If age <= 16 OR age >= 65 Then
1.5            display error message
1.6       end IF
1.7 UNTIL _____
```

   (i) In adding to the original program, state what stage of the *software development process* Gordon is carrying out. **1**

   (ii) Complete the pseudocode for step 1.7. **2**

   (iii) Name the standard algorithm used in this part of the program. **1**

   (iv) Name another *design notation* Gordon could have used to show this algorithm. **1**

   (v) Explain why a *conditional loop* is used in steps 1.2 to 1.7 of this algorithm. **1**

(*d*) Once Gordon's algorithm has been implemented he tests it using the data "sixty-six".

Explain why he would use this item of test data. **1**

(*e*) The program now needs more RAM to run.

Name the guide in which this would be documented. **1**

(10)

Marks

14. Newton Tennis Club has a website.

(*a*) State what type of software is needed to view the website online. **1**

(*b*) Users often worry about their devices being infected by a virus when online.

State a suitable type of software which could be used to protect computers when online. **1**

(*c*) Users of the club's website can download a brochure.

(i) State why the club would provide the brochure in a *standard file format*. **1**

(ii) The club logo is a black and white graphic 1000 × 200 pixels in size.
Calculate the memory requirements, in **kilobytes**, needed to store this file. **3**

(iii) Clicking the logo takes the user to another page on the website.
Name the feature used to do this. **1**

(*d*) Katherine views the website on her laptop.

Name **one** other type of portable computer which she could use to do this. **1**

(*e*) All computers need an *operating system*.

State **two** functions of an operating system. **2**

(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

Marks

SECTION III

Part A—Artificial Intelligence

Attempt ALL questions in this section.

15. Artificial Intelligence has progressed from simple game playing simulations to the sophisticated applications used today.

(*a*) State a computer hardware development that has made such progress possible. **1**

(*b*) Why was game playing a popular area of early artificial intelligence research? **1**

(*c*) Draughts and Tic-tac-toe are popular computer games.

   (i) Explain why these games appear to show intelligence. **1**

   (ii) Some of these games have an option to use *speech recognition*.
State **one** problem which could affect a speech recognition system's accuracy. **1**

(4)

16. ScotBank uses an *artificial neural system* (ANS) to help predict stock market changes.

(*a*) Explain what is meant by an artificial neural system. **1**

(*b*) After the ANS has been constructed, explain what ScotBank must do before it can make accurate predictions. **2**

(*c*) ScotBank could have used an *expert system* for this task.

   (i) State an advantage of using the artificial neural system instead of the expert system. **1**

   (ii) State a possible advantage of using an expert system if the decisions made by the system require an explanation. **1**

   (iii) State **one** advantage of using an expert system rather than a human expert. **1**

(*d*) Give an example of another use ScotBank could have for its artificial neural system. **1**

(7)

         Page eight

Marks

17. The pollen count is a useful indicator of how likely hay fever sufferers will show symptoms.

The knowledge base below shows the pollen count in various Scottish towns and rules about hay fever risk.

1 pollen_count(edinburgh,95).

2 pollen_count(glasgow,106).

3 pollen_count(st_andrews,506).

4 pollen_count(inverness,53).

5 pollen_count(fort_william,306).

6 high_risk(X) if pollen_count(X,Y) and Y>299.

7 medium_risk(X) if pollen_count(X,Y) and Y>100 and Y<300.

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

?pollen_count(edinburgh,X).   **1**

(*b*) State the first solution of the following query:

?medium_risk(Town).   **1**

(*c*) Using the numbering system provided, *trace* the evaluation of the following query:

?high_risk(st_andrews).   **3**

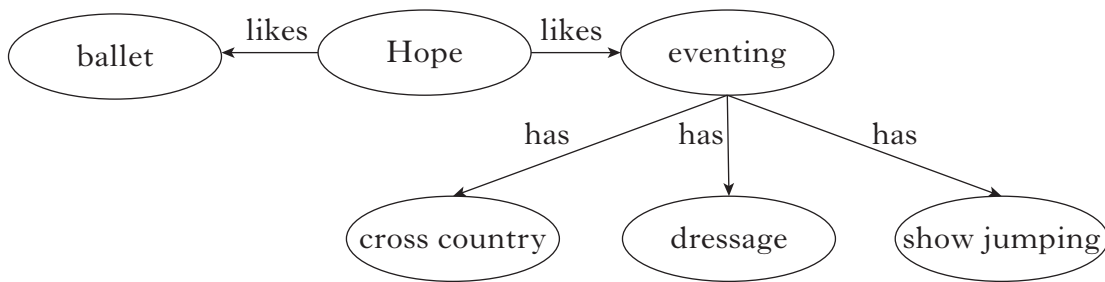(*d*) A pollen count of below 100 is of low risk to hay fever sufferers.

Design a *prolog* rule to identify low risk towns.   **3**
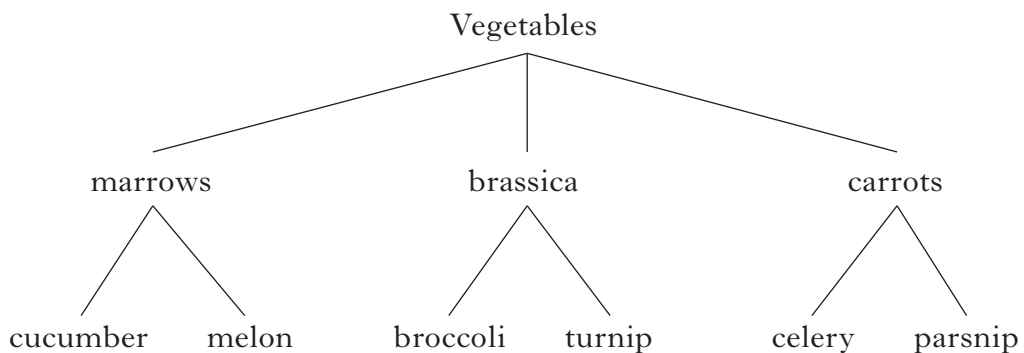
                                                                              (8)

[Turn over

Page nine

Marks

18. A *semantic net*, such as the one shown below, is one way to represent knowledge.

(a) Name the stage of the software development process when a *semantic net* would be drawn.

1

(b) Represent the knowledge base shown in the semantic net above as 5 *prolog* clauses.

3

(c) Part of a search tree of vegetable groups is shown below.

The result of a search for broccoli can be found by using a *depth-first search* or a *breadth-first search*.

(i) List the nodes visited during a depth-first search.

1

(ii) List the nodes visited during a breadth-first search.

1

(6)

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

Marks

SECTION III

Part B—Computer Networking

Attempt ALL questions in this section.

19. Dana uses the Internet for online gaming and leisure.

(*a*) Dana uses a *search engine* to find a list of online gaming sites.

  (i) Describe how Dana would use the search engine to find out about the online version of the game 'WhiteOps3'. **2**

 (ii) When she clicks on the links from some search results the message "site blocked" appears.

  State **one** reason why this may be happening. **1**

(*b*) Dana decides to download the game from the Internet. She uses the following URL to access the download:

http://www.freetotry.com/games/WO3.html

  (i) Name the *protocol* used by this URL. **1**

 (ii) State what the protocol is used for. **1**

(iii) Describe the function of the *Domain Name Service* (DNS) when the page is accessed. **2**

(iv) The file is 460 Mb in size and takes less than 5 minutes to download.

  State which type of Internet connection Dana is likely to be using. **1**

(*c*) Dana does not wish to lose the program she has downloaded so decides to copy it to an external Hard Disk.

  Describe **two** further aspects that should form her backup strategy. **2**

(10)

Marks

20. Greg uses his personal laptop at work. He can connect to a printer and the company's server from anywhere in the building.

  (*a*) (i) State what type of network Greg is using.   **1**

        (ii) State **one** advantage for Greg of not using a cabled connection.   **1**

        (iii) State one hardware requirement for setting up this type of network.   **1**

  (*b*) Many workplace communications are via email due to the speed of delivery.

        (i) State **two** other advantages of email.   **2**

        (ii) Greg's firm has a *code of conduct* for use of email. State **one** thing that would be included in this.   **1**

  (*c*) The company used to use a *dial-up* Internet connection.

        (i) State **two** reasons they may have for changing to a *leased line*.   **2**

        (ii) State **two** types of *network threats* that could lead to failure of the office computer systems.   **2**

  (*d*) Greg can view the company website on his mobile phone using *WAP* and a *microbrowser*.

        (i) What is a microbrowser?   **1**

        (ii) State **one** reason for WAP to use a microbrowser.   **1**

        (iii) Using a mobile phone to access the Internet is an example of *converging technologies*.

           Name **one** other device that uses converging technologies.   **1**

  (*e*) Any sensitive data sent over the company network is *encrypted*.

        (i) Explain what encrypted data is.   **1**

        (ii) The police can demand a copy of the encryption key if they are investigating a crime.
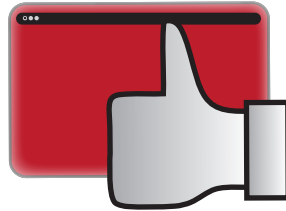
           Name the law that allows this.   **1**

                (15)

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

SECTION III

Part C—Multimedia Technology
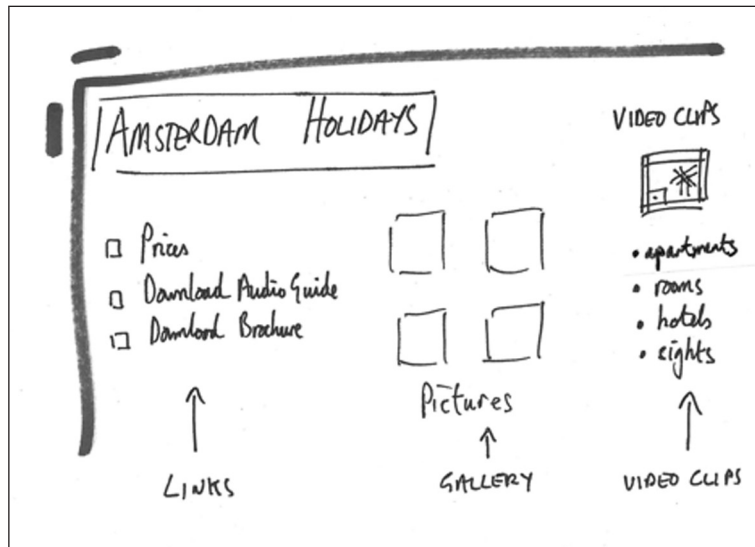
Attempt ALL questions in this section.

21. Karen created the logo below using a graphics package.

(*a*) Describe **two** ways which would allow you to find out whether this graphic was created using a *vector graphics* package or using a *bitmapped* graphics package. **2**

(*b*) (i) Name **two** attributes of an object used in the design. **2**

   (ii) Name an attribute which would be present in a 3D graphic but not in a 2D graphic. **1**

(*c*) Name a file type used to store a vector format graphic. **1**

(*d*) A version of Karen's graphic is stored as a *GIF* file.

   (i) What is the colour depth of this file? **1**

   (ii) GIF uses *lossless compression*.
       Explain what is meant by lossless compression. **1**

   (iii) Name the feature of a GIF format graphic which allows a background to be seen through it. **1**

(*e*) Name the law that prevents other people from using Karen's graphic without her permission. **1**

(10)

Marks

22. Amsterdam Holidays are about to launch its website. A plan is made of each page on the website.

(a) Name the stage of the software development process being carried out here. **1**

(b) Each page could be coded using a *text editor* or a *WYSIWYG* package.

   (i) Describe how a text editor would be used to produce the pages. **1**

   (ii) Describe the differences when using a WYSIWYG editor for page creation instead of a text editor. **1**

(c) When the video clips used for the web pages were first captured they were full screen size.

What change would need to have been made so that they would fit onto the available space on the page? **1**

(d) State which *standard file format* for the audio guide would give good quality sound along with a small file size. **1**

(e) The website will include video clips of Amsterdam.

   (i) State **one** benefit of using a *digital video camera* instead of a *webcam* to capture video for the website. **1**

   (ii) State the hardware device which needs to be installed in a computer to allow it to display video files. **1**

   (iii) Each video clip is 6·4 Mb in size. There is 4 Gb of space allocated on the server for video files.

Calculate how many of these files can be stored in the space provided. **2**

(9)

Marks

23. Popular singing duo "Hope and Freya" are recording a new song on their computer.

   (*a*) (i) Name **two** items of hardware that they must have to capture their song on the computer.   **2**

        (ii) In order to get the best sound quality Hope and Freya use a high *sampling depth*.

            Suggest **one** other method they could employ to improve recorded sound quality.   **1**

   (*b*) A *MIDI* keyboard is used to produce music for the song's backing track.

        (i) State **one** benefit of using MIDI for the backing track.   **1**

        (ii) Name **one** attribute of a MIDI instruction.   **1**

   (*c*) The song is edited using a sound editing system.

       Name **one** feature of the software which could be used in the editing process.   **1**

                                          (6)

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

[*END OF QUESTION PAPER*]