READ THESE INSTRUCTIONS FIRST

Write your Centre number, candidate number and name on all the work you hand in. Write in dark blue or black pen.
You may use a soft pencil for any diagrams, graphs or rough working.
Do not use staples, paper clips, highlighters, glue or correction fluid.
DO NOT WRITE IN ANY BARCODES.

No marks will be awarded for using brand names of software packages or hardware.

Answer all questions.

At the end of the examination, fasten all your work securely together.
The number of marks is given in brackets [ ] at the end of each question or part question.
1 Name the devices A, B, C and D using the words from the list.

A: mainframe computer
C: personal digital assistant

B: laptop computer
D: desktop computer

2 Ring two items which are used to store data.

buzzer
joystick
plotter
touch pad

DVD R

fixed hard disc
3 Tick **True** or **False** next to each of these statements.

<table>
<thead>
<tr>
<th>True</th>
<th>False</th>
</tr>
</thead>
<tbody>
<tr>
<td>Database software is the best software to use to write letters.</td>
<td>✓</td>
</tr>
<tr>
<td>DTP software is used to create models.</td>
<td>✓</td>
</tr>
<tr>
<td>Palmtop computers are bigger than PCs.</td>
<td>✓</td>
</tr>
<tr>
<td>Graph plotters are used to output car designs.</td>
<td>✓</td>
</tr>
<tr>
<td>A dot matrix printer is used to print magazines.</td>
<td>✓</td>
</tr>
</tbody>
</table>

4 An examination mark is recorded as an integer in a database. The marks are between 0 and 100.

Name and describe **two** validation checks which would be used to check the marks as they are entered.

1. Two matched pairs from:
   - Range check
     - Check no less than 0 and no more than 100
   - *(Invalid)* character check/Type check
     - Must be digits only

2. Presence check
   - Mark must be entered

5 Tick whether the following statements apply to **RAM** or apply to **ROM**.

<table>
<thead>
<tr>
<th>RAM</th>
<th>ROM</th>
</tr>
</thead>
<tbody>
<tr>
<td>This memory can only be read from not written to.</td>
<td>✓</td>
</tr>
<tr>
<td>This memory is not volatile.</td>
<td>✓</td>
</tr>
<tr>
<td>This memory is used to store the data the user is currently working on.</td>
<td>✓</td>
</tr>
<tr>
<td>This memory is used to store the startup instructions of a computer.</td>
<td>✓</td>
</tr>
</tbody>
</table>
6 Draw **four** lines on the diagram to match the use to its **most appropriate** input device.

<table>
<thead>
<tr>
<th>Use</th>
<th>Input device</th>
</tr>
</thead>
<tbody>
<tr>
<td>To input details from a bank card</td>
<td>Joystick</td>
</tr>
<tr>
<td>To input data from a school register</td>
<td>Chip reader</td>
</tr>
<tr>
<td>To input details of a product in a supermarket</td>
<td>Optical mark reader</td>
</tr>
<tr>
<td>To control an object in a computer game</td>
<td>Bar code reader</td>
</tr>
</tbody>
</table>

7 A student wishes to use a floor turtle to draw this shape which has no two lines the same length:

Name **four** different instructions which the turtle graphics software could use in order to draw the shape. For each one explain the meaning of the instruction.

Instruction 1

<table>
<thead>
<tr>
<th>Instruction 1</th>
<th>Meaning</th>
<th>Meaning</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>FORWARD n</td>
<td>Move n mm forward</td>
</tr>
</tbody>
</table>

Instruction 2

<table>
<thead>
<tr>
<th>Instruction 2</th>
<th>Meaning</th>
<th>Meaning</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>BACKWARD n</td>
<td>Move n mm backward</td>
</tr>
</tbody>
</table>

Instruction 3

<table>
<thead>
<tr>
<th>Instruction 3</th>
<th>Meaning</th>
<th>Meaning</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>LEFT t</td>
<td>Turn left t degrees</td>
</tr>
</tbody>
</table>

Instruction 4

<table>
<thead>
<tr>
<th>Instruction 4</th>
<th>Meaning</th>
<th>Meaning</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>RIGHT t</td>
<td>Turn right t degrees</td>
</tr>
</tbody>
</table>

Instruction 5

<table>
<thead>
<tr>
<th>Instruction 5</th>
<th>Meaning</th>
<th>Meaning</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>PENUP</td>
<td>Lift the pen</td>
</tr>
</tbody>
</table>

Instruction 6

<table>
<thead>
<tr>
<th>Instruction 6</th>
<th>Meaning</th>
<th>Meaning</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>PENDOWN</td>
<td>Lower the pen</td>
</tr>
</tbody>
</table>

Instruction 7

<table>
<thead>
<tr>
<th>Instruction 7</th>
<th>Meaning</th>
<th>Meaning</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Note:</td>
<td>1 mark for instruction</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Instruction 8</th>
<th>Meaning</th>
<th>Meaning</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>1 mark for meaning</td>
<td>1 mark for meaning</td>
</tr>
</tbody>
</table>
8 Explain what is meant by OCR and give one example of its use.

Optical Character Recognition/Reader
Text is read by scanner and image compared with characters stored in computer then converted to text for use with other software like Word Processing

Example:
Utility bills/word processors/(ANPR) Automatic number plate recognition/identity cards

9 A head teacher has decided that the school magazine will now be included in the school's website.

(a) Tick three features of a website which would not be found in a magazine printed on paper.

<table>
<thead>
<tr>
<th>Feature</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Hyperlinks</td>
<td>✓</td>
</tr>
<tr>
<td>Colour</td>
<td></td>
</tr>
<tr>
<td>Large font size</td>
<td></td>
</tr>
<tr>
<td>Photos</td>
<td></td>
</tr>
<tr>
<td>Sound</td>
<td>✓</td>
</tr>
<tr>
<td>Video</td>
<td>✓</td>
</tr>
</tbody>
</table>

(b) Give three other reasons why the head teacher thinks it is a good idea to replace the paper version with a website version.

1 Three from:
   - More attractive and interactive
   - Saves school cost of printing copies
   - Can include colour at no extra cost

2 Can include animated text effects/video/sound
   - Saves cost of delivery
   - Audience not limited to parents of school children

3

[3]
10 Describe what is meant by a blog.

Four from:
Web Log
Usually one author
Personal opinions on a number of topics/personal thoughts
Can be an electronic diary
Others can comment
Only author can edit entries

[4]

11 Car mechanics often use an expert system to help them with their work in diagnosing car engine faults.

Describe how this system would work.

- Data is read by sensors/downloaded from onboard computer/entered using keyboard/touch screen/answers to questions are typed in
- Uses interactive screen interface/Asks questions based on previous responses
- Inference engine compares data with that held in the knowledge base.
- Comparison is done using rules base
- Matches are found and System suggests possible faults/solutions

[5]
12 A house has a microprocessor controlled central heating system.

(a) Describe the use of the following input devices in such a system.

<table>
<thead>
<tr>
<th>Device</th>
<th>Use</th>
</tr>
</thead>
<tbody>
<tr>
<td>Keypad</td>
<td>to input required/setup temperature</td>
</tr>
<tr>
<td>Sensor</td>
<td>to detect and send current temperature of the room to the microprocessor</td>
</tr>
</tbody>
</table>

(b) Describe how the microprocessor would use the data from these devices to control the system.

- Microprocessor stores required temperature as preset value and compares temperature from sensor to pre-set temperature
- If temperature is lower than preset value microprocessor sends a signal to turn heater on
- If higher than preset value microprocessor sends a signal (to the actuator) to turn heater off
- If values are equal microprocessor does nothing
- Wait set period of time before looping again
Davina has asked Boris, a systems analyst, to create a new database system for her zoo. She keeps animals of all types. Here are some of the questions that visitors to the zoo ask:

What is the name of the female lion you have?
How heavy is Jumbo the elephant?
How much does it cost to adopt a tiger?

(a) Complete the data dictionary below filling in the field names and most appropriate data type to create a database which would answer these questions.

<table>
<thead>
<tr>
<th>Field name</th>
<th>Data type</th>
</tr>
</thead>
<tbody>
<tr>
<td>Name</td>
<td>Text</td>
</tr>
<tr>
<td>Gender</td>
<td>Boolean</td>
</tr>
<tr>
<td>Species</td>
<td>Text</td>
</tr>
<tr>
<td>Weight (kg)</td>
<td>Numeric</td>
</tr>
<tr>
<td>Adoption cost</td>
<td>Currency</td>
</tr>
</tbody>
</table>

(b) Boris will provide two types of documentation when the system is implemented.

Name each type of documentation and for each one give two items which would be included.

Name 1: Technical - Two from:
- Program listing
- Programming language
- Flowchart/algorithm
- List of variables
- File structure
- Input/Output format
- Hardware requirements and software requirements
- Sample runs/test runs
- Known bugs/possible errors
- Validation rules
- Limitations of the system

Name 2: User - Two from:
- How to load software/install/run software
- How to save a file
- How to search
- How to sort
- How to print
- How to add/delete/edit records
- Purpose of the system/program
- Input format or example (only if not mentioned in technical documentation)
- Output format or example (only if not mentioned in technical documentation)
- Hardware requirements (only if not mentioned in technical documentation)
- Software requirements (only if not mentioned in technical documentation)
- Sample runs (only if not mentioned in technical documentation)
- Error messages (only if not mentioned in technical documentation)
- Error handling
- Limitations of the system
- Tutorials
- Troubleshooting guide/Contact details/help line/FAQ
Mobile phones (cellphones) are used for accessing the Internet.

Give two advantages and two disadvantages of using a mobile phone rather than using a desktop computer to access the Internet.

<table>
<thead>
<tr>
<th>Advantage 1</th>
<th>Two advantages from:</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Easy to carry/are portable</td>
</tr>
<tr>
<td></td>
<td>Usually have mobile phone in your possession</td>
</tr>
<tr>
<td></td>
<td>Can access Internet almost anywhere</td>
</tr>
<tr>
<td></td>
<td>Can access Internet on the move [2]</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Advantage 2</th>
</tr>
</thead>
</table>

<table>
<thead>
<tr>
<th>Disadvantage 1</th>
<th>Two disadvantages from:</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Easily lost</td>
</tr>
<tr>
<td></td>
<td>May have poorer signal</td>
</tr>
<tr>
<td></td>
<td>Display is smaller/keyboard is smaller</td>
</tr>
<tr>
<td></td>
<td>Content is more limited</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Disadvantage 2</th>
</tr>
</thead>
</table>

|             | Can be slower to access Internet |
|             | Batteries might run out |
|             | No mouse so can be more difficult to navigate |

[4]
A Sports Science student had to analyse the performance of athletes prior to the 2012 Olympic Games. He created a spreadsheet to do this. Below is his analysis of the javelin event. It is split into two sheets. Sheet 1 contains the Code for each nationality. Sheet 2 contains a list of athletes and the results they achieved in a pre-Olympic event.

Sheet 1

(Commas are used as delimiters in the functions shown below.)

Because athletes sometimes miss a throw or throw outside the area, this is recorded in the spreadsheet as a no throw using the letters NT.

Sheet 2

(a) Explain what the function in cell A3 does.

Either
It looks through (the cells) A2 to B9 in Sheet 1
Compares with 'USA'/the contents of C3 (in Sheet 2)
Or
It reads the contents of C3 (in Sheet 2)
Compares with the contents of A2:B9 in Sheet 1
until it finds the first matching value
It records the corresponding value from column 2 of the range A2:B9 in Sheet 1
C3 (in Sheet 2) contains USA
Produces /records America

[3]
(b) What value would you expect to see in cell A6?

Thailand

[1]

c) Explain what the function in cell G3 does.

It totals the contents
Of cells D3 to F3

[2]

d) Explain what the function in cell H4 does.

It looks through the contents of D4 to F4 to see if they
are not equal to NT
It counts the number of cells that are not Produces
records 2

[3]

e) What value would you expect to see in cell H6?

3

[1]

(f) Spreadsheets are often used to produce computer models. There are however, other
forms of models such as simulations.

Explain, using air pilot training as an example, what is meant by simulation.

Creating a model of a real system (such as a cockpit) in order to study the behaviour of
the system/pilot reactions
Is able to predict/react to the behaviour of the system or pilot
The cockpit simulation has all the controls normally found in an actual cockpit
Creating models of situations that pilots might meet in real life/Creates whatif scenarios

[3]
16 School networks often contain a router and a proxy server.

(a) Describe the role of a proxy server in such a network.

Can act as a web server
Can act as a buffer (between Internet and LAN)
Server passes on requests to the Internet
Passes the requested web pages to individual computers
Can cache/store the webpages
Subsequent requests for that/those web page(s) are responded to more quickly
Can be used to monitor Internet usage
Can block certain sites

(b) Explain the purpose of a router.

Connects a LAN to a WAN
Connects a LAN to the Internet
Forward data packets to the individual computers on a network
Hold the addresses of each computer on the network

17 (a) Explain what is meant by software copyright.

Lawful protection given to authors/software companies and publishers
Relates to the software the author/publisher/company created/published
Prohibits purchaser from making unlimited copies/lend it to others/change the software/sell it without the company’s permission

(b) Explain how software manufacturers attempt to prevent copyright being broken.

Encryption of the execution code requires a key to run
Use of a dongle
Registration system requiring the typing in of a registration code
“Guards” are hardware or software modules that monitor the running program and ensure that it has not been tampered with in any way
Activation code which can be used only on a limited number of machines
Robots are now used on many car production lines.

Discuss the benefits and drawbacks to the car company of using robots.

Car production is more consistent/robots produce the same standard every time
Cost – once bought they do not have to be paid/fewer employees so lower costs/don't have to pay robots wages/lower running costs
No industrial disputes
Greater productivity
Greater accuracy/robots are more accurate
Can work in hazardous/extreme conditions/can lift heavier loads
Robots don’t take breaks/can work 24 hours a day 7 days a week/can work continuously
Robots have to be reprogrammed when there is a small change/can’t think for themselves
Robots need programming in order to be adaptable
Expensive start up costs – redundancy payments
Expensive start up costs – have to spend money on training workers to use robots
Expensive start up costs – buying of robots/programming of robots
Computer crash would halt production
Maintenance/repair costs can be expensive