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 input devices A, B, C and D using the words from the list.

- A: touch screen
- B: scanner
- C: video camera
- D: sensor

2 Ring **two** output devices.

- buzzer
- magnetic tape
- DVD R
- plotter
- joystick
- touch pad
3 Tick **True** or **False** next to each of these statements.

<table>
<thead>
<tr>
<th></th>
<th>True</th>
<th>False</th>
</tr>
</thead>
<tbody>
<tr>
<td>A numeric keypad is used to type a letter.</td>
<td></td>
<td>✔</td>
</tr>
<tr>
<td>Word processing software is used to monitor physical variables.</td>
<td>✔</td>
<td></td>
</tr>
<tr>
<td>A laser printer works best in an industrial environment.</td>
<td>✔</td>
<td></td>
</tr>
<tr>
<td>A palmtop computer is easier to carry than a laptop computer.</td>
<td>✔</td>
<td></td>
</tr>
<tr>
<td>Sensors are used to input data to a microprocessor.</td>
<td>✔</td>
<td></td>
</tr>
</tbody>
</table>

4 Tick **four** devices which are used to connect networks together.

- Hub ✔
- Printer ✔
- Bridge ✔
- Router ✔
- Scanner
- Passwords
- Monitor
- Switch ✔

5 Microprocessors are used in different applications to control the process or to simply gather data (measurement only).

Tick which of the following applications are examples of control or of measurement only.

<table>
<thead>
<tr>
<th></th>
<th>Control</th>
<th>Measurement only</th>
</tr>
</thead>
<tbody>
<tr>
<td>Automatic cookers</td>
<td>✔</td>
<td></td>
</tr>
<tr>
<td>Weather stations</td>
<td></td>
<td>✔</td>
</tr>
<tr>
<td>Microwave ovens</td>
<td>✔</td>
<td></td>
</tr>
<tr>
<td>Automatic washing machines</td>
<td>✔</td>
<td></td>
</tr>
</tbody>
</table>
A floor turtle can use the following instructions:

<table>
<thead>
<tr>
<th>INSTRUCTION</th>
<th>MEANING</th>
</tr>
</thead>
<tbody>
<tr>
<td>FORWARD (n)</td>
<td>Move (n) mm forward</td>
</tr>
<tr>
<td>BACKWARD (n)</td>
<td>Move (n) mm backward</td>
</tr>
<tr>
<td>LEFT (t)</td>
<td>Turn left (t) degrees</td>
</tr>
<tr>
<td>RIGHT (t)</td>
<td>Turn right (t) degrees</td>
</tr>
<tr>
<td>PENUP</td>
<td>Lift the pen</td>
</tr>
<tr>
<td>PENDOWN</td>
<td>Lower the pen</td>
</tr>
<tr>
<td>REPEAT (n)</td>
<td>Repeat the following instructions (n) times</td>
</tr>
<tr>
<td>END REPEAT</td>
<td>Finish the REPEAT loop</td>
</tr>
</tbody>
</table>

Using only the following commands, complete the set of instructions to draw this shape by filling in the blank lines.

PENDOWN

FORWARD 40

REPEAT

RIGHT 90

FORWARD

__________________________

PENDOWN

FORWARD

__________________________

[8]
7 Use the **most appropriate** phrase from the list below to complete each sentence.

- store data in real time applications
- store high definition films
- store backups of file servers
- store music for sale
- store photographs in a digital camera

(i) A CD ROM is used to **store music for sale**
(ii) A blu-ray disc is used to **store high definition films**
(iii) A magnetic tape is used to **store backups of file servers**
(iv) A flash memory card is used to **store photographs in a digital camera**

8 Describe **four** features of ROM.

1. **Four from:**
   - Read only memory
   - Can be read from but not written to/can't be changed/edited
   - Used to store BIOS/start up/Bootstrap programs for computer
   - Used to store software that must not change e.g. games
   - Non-volatile/permanent (memory)

   [4]
9 Robots are now used on many car production lines.

Describe three advantages of this to a car company.

Three advantages from:

1. Car production is more consistent/robots produce the same standard every time

2. 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

3. No industrial disputes/Strikes

4. Greater productivity

5. Greater accuracy/robots are more accurate

6. 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

10 (a) Car mechanics often use expert systems to help them to diagnose faults with car engines.

Tick four components of a typical expert system.

<table>
<thead>
<tr>
<th>Component</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Graph plotter</td>
<td></td>
</tr>
<tr>
<td>Inference engine</td>
<td>✓</td>
</tr>
<tr>
<td>Interactive input screen</td>
<td>✓</td>
</tr>
<tr>
<td>Knowledge base</td>
<td>✓</td>
</tr>
<tr>
<td>Rules base</td>
<td>✓</td>
</tr>
<tr>
<td>Scanner</td>
<td></td>
</tr>
<tr>
<td>Spreadsheet</td>
<td></td>
</tr>
<tr>
<td>Web cam</td>
<td></td>
</tr>
</tbody>
</table>

(b) Name two other applications which involve the use of expert systems.

1. Two from:
   - Medical diagnosis
   - Mineral Prospecting
   - Tax Advising
   - Careers Planning
   - Chess games
   - Animal/plant classification/identification

…………………………..  [2]
11 Give **three** advantages of using a graphical user interface (GUI) rather than a command line interface (CLI).

1. Don’t have to type in commands/just use mouse to select options
2. Easier to change/edit action
3. Don’t have to learn/be familiar with a lot of commands
4. Easier to open/load programs
5. User friendly interface for beginners
12 A company wishes to replace its current system with a new computerised system. It has employed a systems analyst to investigate the current system.

(a) Describe three methods the systems analyst could use to research the current system.

1. Observing the users using the current system
2. Questionnaires are distributed to users asking questions about the current system
3. Interviewing the users about the current system

When large volumes of data are input to a new system it is usual to carry out verification and validation on this data.

(b) Name and describe two methods of verification which could be used.

<table>
<thead>
<tr>
<th>Name</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Visual verification/checking</td>
<td>Read through data on screen and compare with source document</td>
</tr>
<tr>
<td>Double data entry</td>
<td>Data is typed in by two operators then Computer compares versions</td>
</tr>
</tbody>
</table>

(c) Explain why it is necessary to carry out validation even though the data has been verified.

<table>
<thead>
<tr>
<th>Three from:</th>
</tr>
</thead>
<tbody>
<tr>
<td>- Source document may contain errors</td>
</tr>
<tr>
<td>- Verification only checks that data is copied correctly</td>
</tr>
<tr>
<td>- Verification does not check if data is reasonable/sensible</td>
</tr>
</tbody>
</table>

Note: A correct explanation of an example of one validation check
13 A bank is looking into a variety of security measures to protect its customers’ data. It is worried that hackers may gain access and cause viruses to infect the system.

(a) Explain what is meant by a virus and what it does.

Three from:
A piece of programming code/software/program/script
It replicates itself
Attaches itself to files
Corrupts/deletes files/data
Can corrupt or erase the contents of the hard disk
Can completely fill the hard disk/memory making it unusable/slow down operations
Makes software/operating system unusable

[3]

(b) Describe three ways in which a bank customer could protect their computer from becoming infected.

Way 1
- Regularly update antivirus/use/install antivirus
- Only use storage media from known sources

Way 2
- Only accept software/download software from known/trusted websites
- Only visit trusted websites
- Only open attachments from known sources/people you know

Way 3

[3]
14 The manager of a travel company asked her secretary to look into the reliability of trains in Birmingham. The secretary obtained the details of some of the trains. He created two spreadsheets to help him do this.

Sheet 1 is a list of some of the UK stations that trains from Birmingham go to. Sheet 2 consists of the train details he looked at.

<table>
<thead>
<tr>
<th></th>
<th>A</th>
<th>B</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Code</td>
<td>Station</td>
</tr>
<tr>
<td>2</td>
<td>E</td>
<td>Edinburgh</td>
</tr>
<tr>
<td>3</td>
<td>LB</td>
<td>Longbridge</td>
</tr>
<tr>
<td>4</td>
<td>B</td>
<td>Bournemouth</td>
</tr>
<tr>
<td>5</td>
<td>LI</td>
<td>Lichfield</td>
</tr>
<tr>
<td>6</td>
<td>S</td>
<td>Shrewsbury</td>
</tr>
<tr>
<td>7</td>
<td>W</td>
<td>Wolverhampton</td>
</tr>
<tr>
<td>8</td>
<td>LO</td>
<td>London</td>
</tr>
<tr>
<td>9</td>
<td>P</td>
<td>Plymouth</td>
</tr>
</tbody>
</table>

Sheet 1

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

<table>
<thead>
<tr>
<th></th>
<th>A</th>
<th>B</th>
<th>C</th>
<th>D</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Arrival Station</td>
<td>Code</td>
<td>Number</td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>VLOOKUP(B2,Sheet1!$A$2:$B$9,2)</td>
<td>E</td>
<td>=COUNTIF($C$9:$C$18,B2)</td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>VLOOKUP(B3,Sheet1!$A$2:$B$9,2)</td>
<td>LO</td>
<td>=COUNTIF($C$9:$C$18,B3)</td>
<td></td>
</tr>
<tr>
<td>4</td>
<td>VLOOKUP(B4,Sheet1!$A$2:$B$9,2)</td>
<td>S</td>
<td>=COUNTIF($C$9:$C$18,B4)</td>
<td></td>
</tr>
<tr>
<td>5</td>
<td>VLOOKUP(B5,Sheet1!$A$2:$B$9,2)</td>
<td>LI</td>
<td>=COUNTIF($C$9:$C$18,B5)</td>
<td></td>
</tr>
<tr>
<td>6</td>
<td>VLOOKUP(B6,Sheet1!$A$2:$B$9,2)</td>
<td>W</td>
<td>=COUNTIF($C$9:$C$18,B6)</td>
<td></td>
</tr>
<tr>
<td>7</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>8</td>
<td>Arrival time</td>
<td>Minutes late</td>
<td>Arrival code</td>
<td>Late Y/N</td>
</tr>
<tr>
<td>9</td>
<td>11:03</td>
<td>0</td>
<td>E</td>
<td>=IF(B9&gt;0,&quot;Y&quot;,&quot;N&quot;)</td>
</tr>
<tr>
<td>10</td>
<td>11:05</td>
<td>4</td>
<td>LO</td>
<td>=IF(B10&gt;0,&quot;Y&quot;,&quot;N&quot;)</td>
</tr>
<tr>
<td>11</td>
<td>11:07</td>
<td>-4</td>
<td>W</td>
<td>=IF(B11&gt;0,&quot;Y&quot;,&quot;N&quot;)</td>
</tr>
<tr>
<td>12</td>
<td>11:10</td>
<td>13</td>
<td>LO</td>
<td>=IF(B12&gt;0,&quot;Y&quot;,&quot;N&quot;)</td>
</tr>
<tr>
<td>13</td>
<td>11:12</td>
<td>6</td>
<td>S</td>
<td>=IF(B13&gt;0,&quot;Y&quot;,&quot;N&quot;)</td>
</tr>
<tr>
<td>14</td>
<td>11:14</td>
<td>-2</td>
<td>LI</td>
<td>=IF(B14&gt;0,&quot;Y&quot;,&quot;N&quot;)</td>
</tr>
<tr>
<td>15</td>
<td>11:16</td>
<td>0</td>
<td>W</td>
<td>=IF(B15&gt;0,&quot;Y&quot;,&quot;N&quot;)</td>
</tr>
<tr>
<td>16</td>
<td>11:19</td>
<td>-3</td>
<td>LO</td>
<td>=IF(B16&gt;0,&quot;Y&quot;,&quot;N&quot;)</td>
</tr>
<tr>
<td>17</td>
<td>11:22</td>
<td>0</td>
<td>LI</td>
<td>=IF(B17&gt;0,&quot;Y&quot;,&quot;N&quot;)</td>
</tr>
<tr>
<td>18</td>
<td>11:25</td>
<td>6</td>
<td>E</td>
<td>=IF(B18&gt;0,&quot;Y&quot;,&quot;N&quot;)</td>
</tr>
</tbody>
</table>

Sheet 2
(a) Explain what the function in cell A2 in Sheet 2 does.

Three from:

Either
It looks through (the cells) A2 to B9 in Sheet 1
Compares with ‘E’/the contents of B2 (in Sheet 2)
Or
It reads the contents of B2 (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
B2 (in Sheet 2) contains E
Produces /records Edinburgh

(b) What station would you expect to see in cell A3 in Sheet 2?

London

(c) Explain what the function in cell C2 in Sheet 2 does.

It looks through (the contents of) C9 to C18 to see if they contain the code E/contents of B2
Counts all the cells where there is a match
Cell B2 contains the code E
Produces/records the answer 2

(d) What value would you expect to see in cell C4 in Sheet 2?

1

(e) Explain what the function in cell D9 in Sheet 2 does.

It reads the contents of B9 (0) and checks if it is greater than 0
If it is greater than 0 it records Y
If it is not greater than 0 it records N
In this case it produces/records N

(f) What value would you expect to see in cell D11 in Sheet 2?

N
Chi has employed Sarbjit, a systems analyst, to create a new database system for his mobile telephone (cellphone) business.

- He keeps a number of different models in stock.
- Most of the phones have a camera but some do not.
- The rental plans have 100, 200 or 500 free texts depending on the amount the customer pays per month.
- The minimum monthly payment is $10 and the maximum is $100.

(a) Complete the data dictionary below filling in the field names and the most appropriate data types to create a database using only the above information.

<table>
<thead>
<tr>
<th>Field name</th>
<th>Data type</th>
</tr>
</thead>
<tbody>
<tr>
<td>Model</td>
<td>Text</td>
</tr>
<tr>
<td>Camera</td>
<td>Boolean</td>
</tr>
<tr>
<td>Free texts</td>
<td>Integer</td>
</tr>
<tr>
<td>Monthly payment</td>
<td>Currency</td>
</tr>
</tbody>
</table>

(b) Name and describe three different validation checks that could be used on the data in this database.

1. Three matched pairs from:
   - Range check on Monthly payment
     No less than $10, no more than $100
   - (Invalid) character/type check on 'Free texts' field
     Only digits allowed
   - Consistency check on Monthly payment field and Free texts field
     To make sure that number of free texts corresponds to the monthly payment

2. Presence check on any field
   To make sure data has been entered in that field

3. ...
16 A small business wishes to set up a Local Area Network (LAN). The manager is not sure whether to use cables to connect the computers or use wireless technology. Give three disadvantages of using wireless technology.

1. Limited access area of network
2. Strength of signal is weaker
3. Easier to hack into/less secure
   - Physical obstacles can interfere with signal/can cause disconnection

17 Describe four differences between an intranet and the Internet.

Four from:
- Internet is network of networks/intranet doesn’t have to be a network of networks
- Internet is global
- Intranet is within one organisation
- Intranet is private/Internet is public
- Intranets tend to be policed/managed
- Intranet has an extra layer of security using Firewall
- Data found in an intranet is likely to be more reliable/relevant than that found on the Internet
- Internet has more information than an intranet
A supermarket has a number of EFTPOS terminals.

Explain what is meant by EFTPOS and how such a system works.

Six from:

- Electronic Funds Transfer at Point of Sale
- Enables payment for goods at a checkout using credit/debit cards
- Goods are purchased and bill is calculated
- Customer inserts card into chip reader
- Card is checked for validity/reported stolen
- PIN is entered & is compared with that stored on the chip
- If PIN is OK/verified transaction is authorised
- If not, customer is asked to re-enter PIN otherwise transaction is rejected
- Supermarket computer contacts customer’s bank and checks if sufficient funds
- If sufficient funds, transaction is completed/if not, transaction is rejected
- Amount deducted from customer’s bank account
- Amount credited to supermarket’s bank account
- The supermarket EFTPOS terminal produces a receipt