UNIVERSITY OF CAMBRIDGE INTERNATIONAL EXAMINATIONS
International General Certificate of Secondary Education

INFORMATION TECHNOLOGY 0418/01
Paper 1

Candidates answer on the Question Paper.
No Additional Materials are required.

With Answers

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

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.

For Examiner's Use

This document consists of 16 printed pages.
1. Name the objects A, B, C, D and E using the words from the list.

   A: Touch Screen
   B: Video camera
   C: MIDI interface
   D: Plotter
   E: Printer

2. Ring two storage devices.

   - CD ROM drive
   - Memory stick
   - Speaker
   - Temperature sensor
   - Mouse
   - Trackerball
3 Draw five lines on the diagram to match the computer application to the user.

<table>
<thead>
<tr>
<th>Application</th>
<th>User</th>
</tr>
</thead>
<tbody>
<tr>
<td>CAD</td>
<td>a bank worker</td>
</tr>
<tr>
<td>MICR</td>
<td>an examination paper marker</td>
</tr>
<tr>
<td>OMR</td>
<td>a shop worker</td>
</tr>
<tr>
<td>Touch screen</td>
<td>a payroll office worker</td>
</tr>
<tr>
<td>Batch processing system</td>
<td>an aircraft designer</td>
</tr>
</tbody>
</table>

4 For each type of network fill in the communication lines.

(a) Ring network

(b) Star network

(c) Bus network
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>
</tbody>
</table>

Complete the set of instructions to draw these shapes by filling in the blank lines.

\[
\begin{align*}
\text{PEN DOWN} \\
\text{LEFT 90} \\
\text{FORWARD 30} \\
\text{PEN UP} \\
\text{FORWARD 20} \\
\text{PEN DOWN} \\
\text{RIGHT 90} \\
\text{FORWARD 100} \\
\text{RIGHT 90} \\
\text{FORWARD 230} \\
\text{RIGHT 90} \\
\text{FORWARD 75} \\
\text{PEN UP} \\
\text{FORWARD 25} \\
\text{RIGHT 90} \\
\text{FORWARD 80} \\
\text{RIGHT 90}
\end{align*}
\]
6. Tick **true** or **false** next to each of these statements.

   Use of an anti-glare screen can help to prevent headaches.   **True**  **False**

   DTP would be used to monitor a patient’s condition in a hospital.   **False**  **True**

   Control software is used with computerised traffic light systems.   **True**  **False**

   MICR is used for reading data from pencil marks on a form.   **False**  **True**

   Floppy discs hold more data than memory sticks.   **False**  **True**

7. Complete each sentence below using **one** item from the list.

   A bank cheque  A dot matrix printer  A DVD
   A floppy disc  A laser printer  A monitor
   A mouse  An OMR sheet  A trackerball

   (a) ................................................................. is an example of an optical storage medium.

   (b) ................................................................. is an example of a magnetic storage medium.

   (c) ................................................................. is an output device which produces high
   quality hard copy.

   (d) ................................................................. is an input device used mainly by people with
   disabilities.
A brand new hospital will be opening shortly. The management of the hospital requires an up to date computer system. They have employed a systems analyst to help produce the system.

(a) The systems analyst will need to design a patient record system. The data structure and user interface have already been designed.

Describe three other items that will need to be part of the design of the new system.

1. Data capture forms
2. Report layouts/output format
3. Validation routines

(b) The systems analyst will also design a medical staff record system. She will need to produce a screen display which the hospital administrators could use to read details of a member of staff.

Design a suitable output format for displaying the details of one member of staff.

Staff payroll number: [.................] Staff Photo

name: [.................................................................]
address: [.................................................................]
phone no.: [...............]
fax no.: [.........................]
Email address: [...............] @ [...............]
next of kin: [.................................................................]
date of birth: [.../.../........]
gender: [ ] Female [ ] Male

Job title: [.................................................................]
qualifications: [.................................................................]
(c) Having designed the system it will need to be implemented. Part of the implementation will be using test data with the system.

Describe the three types of test data.

1. Normal data i.e. correct/acceptable data/valid data: which is within acceptable range

2. Abnormal data i.e. incorrect/invalid data that is outside the range of acceptability

3. Extreme data i.e. correct data but is on the edge of acceptability

(d) As well as the patient and staff record systems the hospital wants to have a medical diagnosis expert system.

Describe how the systems analyst will create such a system.

Gathering data from experts (interviews)
Designing knowledge base
Creating a knowledge base
Creating a structure to relate each item in the database/knowledge base
Design/create Inference engine
Creating an interrogation technique to get at the data
Designing a user interface/method of displaying the results/method of inputting data/input screen/output screen
Design/create rule base
Testing the system

(e) Name two other uses of expert systems.

1. Machine/Car fault diagnosis
   Mineral/oil prospecting
   Tax/legal advice
   Chess games

2. Plant/animal/rock identification
The hospital will also want to use a computer to monitor a patient’s progress.

Name **three** analogue variables that it will need to measure.

1. Pulse/heart rate
2. Rate of respiration
3. Glucose/sugar level

Although sensors will be used to measure these variables the computer cannot read the data directly.

What device is needed to convert this data and why is it needed?

Analogue to digital converter
Sensors measure analogue quantities
Computers work in digital form
so data from sensors needs to be converted

Give **three** reasons why the hospital plans to use computers and not nurses to constantly monitor critically ill patients.

1. Computers will not take breaks/can operate continuously
   Fewer mistakes/greater accuracy
   More than one variable can be measured at any one time
   Readings can be taken more frequently
2. Results are analysed automatically/faster to react/charts are produced automatically
   More reliable/readings taken at regular intervals
   Nurses are free to do other tasks
   Reduces chance of nurses being exposed to contagious diseases
3. 

...
A shop owner uses a spreadsheet to calculate his profits. This is part of the spreadsheet.

<table>
<thead>
<tr>
<th></th>
<th>A</th>
<th>B</th>
<th>C</th>
<th>D</th>
<th>E</th>
<th>F</th>
<th>G</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Producer</td>
<td>Food type</td>
<td>Number in stock</td>
<td>Cost Price</td>
<td>Selling Price</td>
<td>Profit</td>
<td>Total profit</td>
</tr>
<tr>
<td>2</td>
<td>Logeeks</td>
<td>Potato flakes</td>
<td>123</td>
<td>$2.30</td>
<td>$2.90</td>
<td>$0.60</td>
<td>$174.00</td>
</tr>
<tr>
<td>3</td>
<td>Squarebranch</td>
<td>Chocolate bar</td>
<td>156</td>
<td>$0.75</td>
<td>$0.95</td>
<td>$0.20</td>
<td>$131.50</td>
</tr>
<tr>
<td>4</td>
<td>Roos</td>
<td>Beersburgers</td>
<td>135</td>
<td>$1.25</td>
<td>$1.55</td>
<td>$0.30</td>
<td>$105.50</td>
</tr>
<tr>
<td>5</td>
<td>Kaprais</td>
<td>Gatsby</td>
<td>69</td>
<td>$3.20</td>
<td>$3.95</td>
<td>$0.75</td>
<td>$66.75</td>
</tr>
<tr>
<td>6</td>
<td>Starlie</td>
<td>Yogurt cream</td>
<td>119</td>
<td>$1.60</td>
<td>$1.85</td>
<td>$0.25</td>
<td>$41.85</td>
</tr>
<tr>
<td>7</td>
<td></td>
<td>Total in stock</td>
<td>624</td>
<td></td>
<td></td>
<td></td>
<td>$254.30</td>
</tr>
<tr>
<td>8</td>
<td></td>
<td>Overall profit</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

(a) Give the cell reference of the cell that contains 89.

\[ \text{C5} \] [1]

(b) Give the cell reference of a cell that contains text data.

Any in range: A1:A6, B1:B6, C1:G1, B8, E8:F8 [1]

(c) Write down the formula which should go in cell F2.

\[ =E2-D2 \] [1]

(d) Write down the formula which should go in cell C8.

\[ =\text{SUM(C2:C6)} \]

or

\[ =\text{C2+C3+C4+C5+C6} \] [1]

(e) A similar formula should go in cell G8. Describe how somebody could get this formula in G8 without typing it in.

Copy cell C8
Paste into G8
or
Click on cell G8
Double click on Autosum/click on Autosum and press enter
or
Click on cell C8
Ctrl+C then move to G8 Ctrl+V [2]

(f) This is an example of a financial model.

Give two examples of computer models, other than financial models.

1. Designing structures of buildings/architects designs
   - Flight simulation/car driving simulation
   - Simulating chemical reactions
   - Simulating nuclear reactions
   - Coastal erosion simulation
2. Population growth simulation
   - Till Queuing in shops simulation
A company has many branches throughout the country. Rather than organising conferences at hotels it uses video conferencing to bring its workers together.

(a) Explain what is meant by video conferencing in terms of:

(i) the hardware required

Webcams/small video cameras
Microphones
Speakers
Modem

(ii) how it works

Hardware connected using cables/USB
(What each component of hardware does)
employees are connected on-line/may need to access the Internet/WAN
to work
Images of the employees appear on the screen in real time
Network Operating Software is needed in each computer to operate the conference
Employees can be heard by all the other employees in the conference

(b) Give two disadvantages of video conferencing compared with conventional conferencing.

1. Different time zones make it difficult to have a video conference between people in different countries
2. Initial/Start up costs can be high/equipment can be expensive to buy
   Failure of Communication link/can go down/reception can be poor
   Equipment can fail
   Can seem impersonal
   Pictures and sound can be out of synchronisation/not timed correctly
   Original documents needs to be signed
   Not productive as face to face meeting

Many schools use both an Intranet and the Internet.

Give three differences between an Intranet and the Internet.

Internet - INTERnational NETwork
1. Is a Wide Area Network (WAN)
   Can access it from anywhere
   Greater amount of information available with unlimited access
   Intranet - INTernal Restricted Access NETwork
2. Usually a Local Area Network (LAN)
   Password controlled pages
   Well protected/secured working behind behind a firewall
   Can set up specific information pages on Intranet systems
3. Information within the school is easily accessible by all users
   Can limit the places where users can go to study using access rights
   No wasted time looking through millions of resources
   Intranet is better protected for use of e-mails/from viruses/from hackers
12 Since the invention of the microprocessor many labour saving devices have been introduced into the home.

(a) Apart from home computers, give two examples of these microprocessor controlled labour-saving devices.

1 Microwaves
   Ovens
   Washing machines
   Dish washers
2 Or any reasonable labour saving device

(b) Describe the effects these devices could have on a person’s lifestyle.

- Increased leisure time/free time/more time to do other things
- Increase in social interaction
- Can go out whenever they want
- Home jobs can be done on timed operation automatically while person is out of home
- Unhealthy diet – TV dinners
- Better quality meals – easier to prepare exotic dishes
- Part time workers can now work full time

13 Below are three statements about methods of implementation of a new computer system. Tick whether they are true or false.

<table>
<thead>
<tr>
<th>True</th>
<th>False</th>
</tr>
</thead>
<tbody>
<tr>
<td>Parallel running allows you to have a backup system</td>
<td>✓</td>
</tr>
<tr>
<td>Direct changeover requires twice as many workers to employ</td>
<td></td>
</tr>
<tr>
<td>Phased implementation is a quicker method than direct changeover</td>
<td></td>
</tr>
</tbody>
</table>
A house has a burglar alarm system. Describe the inputs, outputs and processing involved in such a system.

**Input:**
- Pressure pads
- Light sensors
- Temperature sensors
- Contact switches/push switch
- Input keypad
- Pass number input to keypad
- Zones selected
- Sound sensor
- Infra red sensor/proximity sensor
- Motion sensor/movement sensor
- Digital/video camera

**Processing:**
- Microprocessor continually monitors sensors.
  - If light sensor detects light beam interrupted:
  - If movement sensor activated:
  - If contact switch activated:
  - If pressure sensed by processor is greater than preset value:
  - If temperature sensed by processor is greater than preset value:
  - If sound sensed by processor is greater than preset value:
- Microprocessor sends signal to output device.

**Outputs:**
- Alarm light flashes/lights come on
- Alarm sounds set on
- Signal automatically sent to police computer system

(Must have at least one from each section to gain full marks)
A school has two separate computer networks. One is used for keeping pupil and staff records. The other is for pupils to use in lessons to help with their learning and also to store their work.

(a) The head teacher does not want to have the two networks connected because he is worried that personal data could be misused.

Describe three ways in which personal data might be misused.

1. Looking at other people’s data and spreading data around
2. Changing other people’s data
3. Deleting other people’s data

(b) In order to prevent data from being misused he will control access to the pupil and staff record systems. Describe how he can do this.

1. Use of usernames/identification/IDs
2. Use of passwords
3. Use of Firewalls
4. Physical security/locks of computers/room
5. Use of biometrics such as fingerprint/Eye print/voiceprint recognition system
6. Special access rights for administrator

(c) He will also ensure that the personal data is encrypted.

Describe how encryption will help protect the data.

1. Encryption makes data in unreadable form/not understandable when hackers get hold of /intercept data during transmission
2. No one will be able to read encrypted data unless he has decryption key
3. Protects data during transmission phase
4. Results in data which is not understandable
5. Is understandable only to authorised users
6. Need a decryption key/software to decrypt data
(d) He has asked some senior pupils to help in producing a printed school magazine for distribution to parents. The first edition will contain pictures of pupils in lessons together with some information about the lessons.

Describe how the pictures will be obtained and how the magazine will be created.

| Open/use Desk Top Publisher(DTP)/word processing package | ..... |
| Create frames/boxes/design layout | ..... |
| Take photo using camera | ..... |
| Upload from camera/load from CD ROM/scan photo by a scanner | ..... |
| Save the picture | ..... |
| Load magazine document | ..... |
| Import/copy and paste/insert into document | ..... |
| Position the picture/resize picture/editing picture | ..... |
| Type text/import text files | ..... |
| Print the magazine with a suitable printer and distribute | ..... |

(e) Some pupils have said that they would prefer to produce a web site for the school magazine.

Describe three features a web site would have which hard copy would not.

| Feature 1 | Sound like speech/music can be heard |
| Video/animation | ..... |
| Links to other websites | ..... |
| Hot spots | ..... |
| Feature 2 | Buttons for navigation/moving around the site |
| Hit counters to count visitors | ..... |
| Feature 3 | ..... |

(f) Give three disadvantages of having a web site instead of hard copy.

| Disadvantage 1 | Website can be hacked into and modified |
| Viruses can be introduced to user computer | ..... |
| Can be difficult to read/navigate | ..... |
| Disadvantage 2 | Have to have a computer |
| Is not portable | ..... |
| Have to have a modem/Internet/router | ..... |
| Can accidentally go to undesirable sites | ..... |
| Cost of maintaining website | ..... |
| Disadvantage 3 | Technical knowledge/training required to maintain website |
Pupils use the Internet quite frequently in their lessons to help them with their work. Discuss the advantages and disadvantages of this as far as a pupil is concerned.

**Advantages-**
- Information is up to date
- Easier to produce neatly presented work
- Internet has vast/large amounts of information
- Speed of search only if referring to use of search engine

**Disadvantages-**
- Danger of accessing doubtful websites.
- Can take long time to find required information
- Can access biased websites
- Can access inaccurate websites
- Lack of expertise leads to inefficient searching
- Can get easily distracted

One health problem can be mentioned as a disadvantage (in any work with online computer system)

*+ reasoned conclusion at the end about all of these issues*

*(Must be at least one of each (advantage + disadvantage) to gain full marks)*
16 Most travel agents use computers for their businesses. Each travel agent has a computer terminal which is connected on-line to a central computer.

(a) Describe the computer processing which occurs when a person visits a travel agent to book a plane ticket.

- Departure airport typed in
- Arrival airport/destination/country typed in
- Date of departure typed in
- Duration of holiday typed in
- Computer database searches for matching departure airport
- If match found
- Computer database searches for matching arrival airport
- If flight on correct date found
- Search if seats/tickets available
- If so marks seat as booked
- Reduces number of seats/tickets available by one
- Prints flight details showing confirmation of booking

(b) Describe batch processing and give a reason why this would not be a sensible method for booking tickets.

- Batch processing deals with a collection of data over a period of time
- Data later on will be processed all at once/in one go
- Usually at quiet processor times
- This will make booking not suitable as double booking could occur
- People would have to wait to see if their booking was made
- Cannot change options if no flights available
- People need a quick response in a reasonable time about flight availability
- So booking system needs an online interactive system to allow human to change/amend options