Example Paper 2 marking Scheme

1. (a) Award *[1 mark]* for the answer below; up to *[1 mark]* max.
–1 is the sentinel / rogue / terminating value;
Accept a written description (*e.g.* –1 indicates the end of the values *etc.*) for *[1 mark]*.

(b)

```
declare NUMENTRIES integer

procedure RECTIFY

   declare POS integer

   POS ← 1
   while BRANCH(POS) # -1 do
      if BRANCH(POS) = 2 then
         SALES(POS) ← SALES(POS) + 10
      endif

      pos ← POS + 1
   enddo

   NUMENTRIES ← POS -1

endprocedure RECTIFY
```

- *[1 mark]* declaring the variables;
- *[3 marks]* for correct loop distributed as follows:
  - *[1 mark]* initialising `POS`;
  - *[1 mark]* incrementing `POS`;
  - *[1 mark]* for correct condition `BRANCH(POS) # -1`;
- *[1 mark]* for correct logical expression in `if` statement;
- *[1 mark]* for updating `SALES`;
- *[1 mark]* assigning `NUMENTRIES ← POS - 1`.

Question 1. continued

(c) Award marks as indicated below the algorithm; up to *[14 marks]* max.
This is an example:

```
procedure SORT
declare FIN, POS, TEMP, NUMENTRIES integer
declare SWAP boolean
   if NUMENTRIES < 2 then
      output "already sorted"
   else
      FIN ← NUMENTRIES
      repeat
         SWAP ← false
         POS ← 1
         while POS < FIN do
            if BRANCH[POS] > BRANCH[POS+1] then
               TEMP ← BRANCH[POS+1]
               BRANCH[POS+1] ← BRANCH[POS]
               BRANCH[POS] ← TEMP
               TEMP ← SALES[POS+1]
               SALES[POS+1] ← SALES[POS]
               SALES[POS] ← TEMP
               SWAP ← true
            endif
         POS ← POS+1
         enddo
      FIN ← FIN-1
      until (not SWAP) or (FIN=1)
   endif
endprocedure SORT
```

[1 mark] declaring the variables;
[1 mark] for initialisation;
[3 marks] repeat loop (outer);
[1 mark] for **any** loop;
[1 mark] for terminating at NUMENTRIES;
[1 mark] for terminating loop when all elements are in desired order (SWAP = false).
[2 marks] `while do` (inner) loop;
[1 mark] for `while` loop (check if any other loop valid);
[1 mark] for terminating at numentries (candidates might test for –1 entry);
[1 mark] testing `if...then`;
[2 marks] swapping elements of BRANCH array;
[2 marks] for swapping contents of BRANCH array. (Give *[1 mark]* for attempt, but incorrect, *e.g.* SWAP contents);
Give *[1 mark]* for any, attempt at swapping contents of second array. No mark awarded for initial if test at this level. Added for completeness;
[1 mark] swapping elements of SALES array;
[1 mark] setting Boolean variable SWAP to false;
[1 mark] incrementing POS;
[1 mark] decrementing FIN.

continued

Question 1. continued

(d) (i) Award marks as indicated below; up to *[6 marks]*.

LOC

2
3
1
1
1

FINAL

[1]	[2]	[3]
45	37	
38	18	25
63		
21		
25		

- *[2 marks]* for LOC, award *[1 mark]* for a minor error;
- *[2 marks]* for correct column 1 in FINAL, *[1 mark]* for a minor error;
- *[1 mark]* for column 2 in FINAL;
- *[1 mark]* for column 3 in FINAL;

(ii) Award up to *[2 marks]* for a full explanation; *[1 mark]* for a partial answer.

The algorithm places the sales figures from SALES into a two-dimensional array called FINAL where each row represents a branch.

2. (a) (i) Award *[1 mark]* for each correct scenario identification, up to *[2 marks]*:

- each instrument for measuring patient's heart rate, blood pressure or respiration is plugged into a hospital wide network;
- when a patient's heart rate, blood pressure or respiration goes outside predetermined limits program automatically sounds an alarm;
- surgery – using a mini-camera;
- medical records are sent between hospitals using e-mail (telephone lines).

(ii) Award *[2 marks]* for a complete answer, *[1 mark]* for an answer with some credit:

- Each computer uses binary (0s and 1s).

Since data obtained from measuring instruments (waves) cameras (images) is analogue it should be converted (digitised) to be suitable for storage and processing in a computer.

(b) *[2 marks]* for a clear outline of a task; *[1 mark]* for a partial outline; maximum *[8 marks]*.
Examples include:

- the system analyst carries out a feasibility study that will consider the practicality and financial aspects of installing a new system in place of the current system. (Advantages and disadvantages of the new system are pointed out within the feasibility study.);
- performs interviews and other fact gathering to discover user requirements;
- documents and analyses current system operations to see where computers can be used/improvements made;
- defines user requirements for improving or replacing systems;
- identify hardware and software needed in suggested system(s);
- designs system inputs, outputs, procedures and flow of information;
- trains users to work with new system;
- *etc.*

(c) *[2 marks]* for a clear outline, *[1 mark]* for a partial outline.

According to the case study, records are exchanged via e-mail. The doctor wanting to receive the record will e-mail his/her request to the hospital holding the record in question. The data administrator (or other authorised person) then sends a return e-mail to the doctor with the patient record stored in an attached file.

Question 2. continued

(d) (i) *[1 mark]* for a GUI description; *[1 mark]* for using a reference to an appropriate point-and-click device.

This refers to the use of a graphical user interface such as Windows or a Macintosh operating system where the user can refer to graphical items such as icons, windows, menus, *etc.* These are frequently accessed/used by moving a device such as a mouse or track ball to read menus, open the files indicated by icons *etc.*

(ii) *[2 marks]* for a complete answer, *[1 mark]* for a partial/vague answer.
Example:
- because pointing and clicking on graphical objects with a mouse reduces learning time for users and gives them a greater feeling of control.

OR
- Text entry systems require learning specific commands whereas a GUI is quicker to use and commands don't have to be memorised;
- *etc.*

(e) Award *[1 mark]* for each correct measure, up to a max. of *[3 marks]*.
Examples:
- use of passwords to access records;
- encryption of data records;
- use of software to prevent computer viruses from modifying records;
- physically securing the computer room and all other rooms in hospital where data is kept against fire, flood, theft, *etc.*;
- security checks of personnel;
- *etc.*

(f) *[4 marks]* for a thorough discussion with supporting arguments from the case study;
[3 marks] for some discussion with supporting arguments from the case study;
[2 marks] for some discussion but with no reference to the case study;
[1 mark] for relevant point dealt with in a trivial manner.
Examples:
If the new system allows for the portable machines that aid in diagnosis, it could turn out that less people will be admitted for examinations and testing. Demand for beds could be less as a result and the extra 15 beds would not be as big an issue. Likewise, if microsurgery also becomes a prominent part of the new system, patients will need a shorter recovery time. This too will put less stress on the number of beds needed. It is also possible that, if local doctors have access to the system, some health problems which might have led to hospitalisation could now be handled locally.
OR
If an analysis concludes that no more patients have been treated (for example with the microsurgery), or that more mistakes have been made (for example with the drug stocks), over a certain period of time with the new system in comparison to the old, then it can be said that the money will not have been well spent.

3. (a) *[1 mark]* for each function stated, up to a maximum of *[5 marks]*.

128 MB RAM
The random access memory is the volatile internal memory of the computer where programs and data can be read and written.

8 GB Hard disk
A hard disc drive is the external permanent storage medium.

256 kB Cache memory
Cache memory is a volatile, read/write memory directly associated with the processor. It acts as a go between for the processor and RAM.

400 MHz Processor
The processor is where instructions are decoded and executed.

2 Serial & 2 Parallel Ports
These are access points to which peripherals can be connected.

(b) *[2 marks]* for each good explanation, *[1 mark]* for each partial explanation, max. *[10 marks]*.

128 MB RAM
128 megabytes of RAM is large and it means either that large programs can now be run which could not on a machine with smaller RAM or program execution is made faster since less disc access/overlaying is needed.
Larger programs are stored during execution here.

8 GB Hard disk
8 gigabytes is extensive and thus more programs and/or data can be stored than on a machine with a smaller disc capacity. A large capacity disc drive provides ease of storage as opposed to many floppy discs.
All a user software *e.g.* word processor or games, can be permanently installed here.

256 kB Cache Memory
Cache provides faster access than standard RAM and therefore program execution is made faster. Commonly used instructions from a program are stored here and the processor is able to more quickly find them.

400 MHz Processor
Programs are executed faster than in machines with a slower processor (all other factors being equal). The decoding and execution of user programs will be noticeably faster than on computers with a slower processor. Multitasking will be dealt with more efficiently.

2 Serial & 2 Parallel Ports
With more peripherals available on the market, older machines may not have enough external links. Having both serial and parallel ports allows for devices with different interfaces to be connected to the computer.