INTERNATIONAL BACCALAUREATE
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MARKSCHEME

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COMPUTER SCIENCE

Standard Level

Paper 2

1. (a)

SMONTH	P	MONTHS(P)	SMONTH # MONTHS(P)
"March"	0	"January"	true
"March"	1	"February"	true
"March"	2	"March"	false

Allocate [2 marks] for each correct line (obviously the last two lines only as the rest is given in the question). One mistake in a line gives [1 mark] and two mistakes gives zero.

(b) return P+1 instead of P; *[2 marks]*

(c) One possibility is as follows:

```
function TOTAL(val SMONTH string val NDAYS integer)
   result integer
   declare I, N, P integer
      N<-- MONTHNUMBER(SMONTH)
      if N>12 or NDAYS>DAYS(N) then return -1
        else P<-- 0
          for I = 1 upto N-1 do
            P<-- P+ DAYS(I)
          endfor
          P<-- P+NDAYS
      endif
      return P
endfunction TOTAL
```

Algorithms may vary but award marks as allocated, up to a maximum of [12 marks].
pass by value of SMONTH and NDAYS *[1 mark]*;
declaration of variables used in function *[1 mark]*;

correct call to MONTHNUMBER *[1 mark]*;
check on validation of result *[1 mark]* and NDAYS *[1 mark]* return -1 if neither valid *[1 mark]*;
putting P to zero before the loop *[1 mark]*;
correct pass through DAYS up to N-1 *[2 marks]* accumulating number of days *[1 mark]*
add on NDAYS *[1 mark]*;

correct return *[1 mark]*;

(d)
```
declare FIRST,SMALLPOS,CURRENT integer TEMP string
    forFIRST = 1 upto 11 do
        SMALLPOS<-- FIRST
        CURRENT<-- SMALLPOS+1
        while CURRENT#12 do
            if MONTHS(CURRENT)<MONTHS(SMALLPOS)
                then SMALLPOS< -- CURRENT
                    CURRENT< -- CURRENT+1
            endif
        endwhile
        TEMP<-- MONTHS(FIRST)
        MONTHS(FIRST)<-- MONTHS(SMALLPOS)
        MONTHS(SMALLPOS)<-- TEMP
    endfor
```

Looping may be implemented differently but award marks as allocated, up to a maximum of [12 marks].

loop from 1 to 11 *[1 mark]*;
allocate SMALLPOS and CURRENT *[2 marks]*;
loop until the end of array *[1 mark]*;
correct test for MONTHS(CURRENT)<MONTHS(SMALLPOS) *[1 mark]*;
place CURRENT in SMALLPOS *[1 mark]*;
increment CURRENT *[1 mark]*;
correct end of loop *[1 mark]*;
swap MONTHS(SMALLPOS) with MONTHS(FIRST) *[2 marks]*;
correct end of loop *[2 marks]*;

2.   (a)   *Award [1 mark] for a suitable advantage and [1 mark] for a suitable disadvantage. For example:*
Advantage
human error such as typing mistakes or misreading the instrument is eliminated;
Disadvantage
if the instrument develops a fault the incorrect data could be transmitted without being noticed;

(b)   *Accept* **two** *distinct error checking methods. Award [1 mark] for identifying the method and [1 mark] for description, up to a maximum of [4 marks]. For example:*
parity bit added to packet. If receiving end does not have even (or odd) number of bits then error detected;
check sum sum of bits added to packet. If receiving end does not have the same sum error detected;
transmit twice and compare the first transmission with the second. If not the same then error detected;
anything more sophisticated accepted if briefly described;

(c)   *Features of the format could appear in the description of the format* **or** *the explanation of the conversion so award marks as follows.* **Note***: that only [3 marks] maximum are available overall for this question.*

METAR format is a type of shorthand *[1 mark]*;
containing all the important weather factors *[1 mark]*;
standard format that can be interpreted by all receivers *[1 mark]*;   *[2 marks max]*

weather details translates into understandable format *[1 mark]*;
manipulated by software *[1 mark]*;
to give text version of forecast that can be read and understood *[1 mark]*;   *[2 marks max]*

(d)   *Award [2 marks] for each valid comparison, up to a maximum of [6 marks]. For example:*
6250 bpi tapes are sequential access media whereas the disks used in the robotics system are direct access;
give credit for tapes have to be physically loaded whereas robotic system programmed to load automatically;
tapes can be stored away from the building as soon as they are full whereas disks are left on the system for convenience hence more vulnerable to damage if the building was on fire;
more convenient access from a disk since it can program the appropriate time period and access data. The tape has to be physically found and loaded;
capacity is high on both. There is no mention in the case study as to size of either but any comparison that includes an interpretation of 6250 bpi as 6250 bits per inch would gain a mark;

(e)   *The two uses mentioned in the Case Study are to improve long term forecasting and keep a track on environmental changes. Award [1 mark] for a correct identification and [2 marks] for a discussion, up to a maximum of [6 marks]. For example:*

Improved long term forecasting
helps farmers to plan crop sowing and harvesting *[1 mark]* hence an advantage to the economy *[1 mark]*;
allows for fuel consumption predictions *[1 mark]* better planning means less chance of crisis situations developing *[1 mark]*;
etc.

Environmental changes
effect on climate of pollution *[1 mark]* could persuade governments to take measures *[1 mark]*;
global changes outside our control such as ice age approaching, change in precipitation patterns *[1 mark]*;

(f)   *Award [1 mark] for identifying a factor and [1 mark] for how it could be avoided, up to a maximum of [4 marks]. For example:*
insufficient data from collection stations *[1 mark]* either increase the number of instruments *[1 mark]* or open new centres in specific regions *[1 mark]*;
software not sophisticated enough or not using enough variables *[1 mark]*. Adapt software to incorporate more sophisticated equations or more variables *[1 mark]*;

*Note: Do **not** accept factors that state that super computers are not powerful enough.*

3.   (a)   (i)   a single task process is one where the computer is running one program
at a time;   *[1 mark]*

(ii)   collecting and sending of data from the instruments;   *[1 mark]*

(b)   *Award marks as follows, up to a maximum of [4 marks].*
text to be read out *[1 mark]* by printer *[1 mark]*;
pictorial output imposed on map of region *[1 mark]* video/screen output *[1 mark]*;

(c)   *Award marks as follows, up to a maximum of [6 marks].*
data input from extra instruments *[1 mark]* from data vendors *[1 mark]*;
processing *[1 mark]* labelled *[1 mark]*;
output to printer *[1 mark]* output to screen *[1 mark]*;

(d)   *Award [1 mark] for giving two of the following processes that could be taking place.*
multi-tasking between processing the weather data, word processing a document, creating
DTP document

Award [1 mark] for any of the following, up to a maximum of [2 marks].
system performs one process for a fixed time or until interrupt
stores relevant data and addresses
moves to second process and repeats
user unaware that there has been a swap since rapid compared to user

Example may be included in description or stated separately.