



UNIVERSITY OF CAMBRIDGE INTERNATIONAL EXAMINATIONS
International General Certificate of Secondary Education

COMPUTER STUDIES

0420/01

Paper 1

For Examination from 2011

SPECIMEN MARK SCHEME

2 hours 30 minutes

MAXIMUM MARK: 100

This document consists of **10** printed pages.



1 **One** mark for each property and **one** mark for each reason:

consume little power

.... hence prolonging internal battery life

run cool

.... thus minimising problem of heat dissipation

no processor fans required

.... therefore prolonging internal battery life

[4]

2 **(a)** Any **two** points from:

- sensors collect data from weather stations
- readings from weather stations sent to the weather centre on disk etc.
- readings from other sources (e.g. airline pilots) sent to weather centre
- weather balloons, satellites, etc. send information remotely

[2]

(b) Any **two** points from:

- system compares known weather patterns/data
- with new data received
- known weather patterns produced from previous data
- carries out a statistical probability calculation of most likely weather

[2]

(c) Any **two** ways from:

- "weather map" superimposed map of country/area
- can show changes in weather patterns in time (e.g. movement of clouds)
- produces series of figures showing pressures, temperatures, etc.
- produces colour-keyed symbols to show temperature, rainfall, etc.

[2]

3 **(a)** Any **two** points from:

- required values stored on embedded microprocessor in the oven
- when barcode read, stored values retrieved
- and are compared to data on the microprocessor
- oven automatically sets timings, temperatures, etc.

[2]

(b) Any **two** advantages from:

- can't get it wrong
- no need to set the oven manually (e.g. power settings)
- cooking conditions can be variable – therefore produce ideal cooking environment

[2]

4 (a) Any **two** points from:

- use of global positioning satellites
 - satellites transmit signals to Earth
 - car system receives signals from (at least 3) satellites ...
 - ... and calculates position of car
 - combines satellite information with stored maps to allow directions
- [2]

(b) Any **one** point from:

- safer – no need to read maps
 - allows driver to concentrate on driving
 - no need to interpret maps
- [1]

(c) Any **two** reasons from:

- road changed – therefore no longer matches stored maps
 - global positioning not sufficiently accurate
 - (temporary) loss of signal
- [2]

5 (a) Any **two** difference from:

- (Internet) INTERnational NETwork
 - (Intranet) INTERNAL Restricted Access NETwork
 - Intranet only gives local information relevant to, e.g. a company
 - can block access to sites outside the company network
 - based on a local network, not necessary to have external modems
 - information stored on local servers
 - Internet can be accessed from anywhere
 - Internet available to everyone; intranet requires password entry
 - intranet is behind a firewall
 - a computer network, based on Internet technology, that is designed to meet the internal needs for sharing information within a single organisation or company
 - an intranet is a web site geared toward use specifically by a company's employees. It will often contain company or project-specific information that allows employees to coordinate more efficiently
- [2]

(b) Any **two** reasons from:

- safer since less chance of external hacking or viruses
 - can prevent workers accessing unwanted sites
 - can ensure information is specific to the company
 - easier to send out “sensitive” messages to remain within company only
- [2]

6 (a) Any **two** advantages from:

- more secure since user needs both the card and the PIN to access
- secures online transactions since smart card read directly
- and this contains encryption algorithms etc.

[2]

(b) Any **two** advantages from:

- passport cannot be copied – reduces fraud
- chip contains personal data which identifies passport owner
- induction loop allows passport to be read by “portal” readers

[2]

7 Any **five** descriptions of systems life cycle stages:

- fact finding (e.g. by way of interviews etc.)
- feasibility study (e.g. cost benefits etc.)
- analysis stage (e.g. analyse company requirements etc.)
- design stage (e.g. determine hardware and software etc.)
- testing strategies (e.g. how to test validation routines etc.)
- user/technical documentation (e.g. technical doc contains algorithms etc.)
- implementation (e.g. immediate changeover etc.)
- evaluation (e.g. feedback on ease of use of new system etc.)
- maintenance (e.g. new hardware added to meet a new need etc.)

[5]

8 (a) larger memory capacities in smaller space

[1]

(b) Any **two** ways from:

- send an email/message from phone to computer
- take out the memory card and connect to computer
- connect phone via USB port to computer

[2]

(c) Any **two** advantages from:

- on the move, can download information on maps etc.
- can readily download bus timetables etc. when away from home
- can access websites while at, e.g., the supermarket doing shopping

[2]

9 **One** mark for each correct error identified

line 20 – **smallest** should be set at a high value such as **smallest = 100000**

line 30 – loop does 101 iterations; should be **for** x=1 **to** 100

line 70 – count not required inside **for** loop; x = x + 1 would corrupt the loop

[6]

10 **One** mark for correct output, **two** marks for other two columns being correct

trace tables:

(i)

X	N	T	A	B	C	Output
1	5	30	0	0	0	3, 2, 0
2		20	1			
3		-20	2	1		
4		10	3			
5		-30		2		
6						

← ----- 1 mark ----- → ← ----- 1 mark ----- → ← 1 mk →

[3]

(ii)

X	N	T	A	B	C	Output
1	8	0	0	0	0	2, 1, 5
2		0			1	
3		-10		1	2	
4		5	1			
5		20	2			
6		0			3	
7		0			4	
8		0			5	
9						

← ----- 1 mark ----- → ← ----- 1 mark ----- → ← 1 mk →

[3]

11 **One** mark per two rows:

Truth table:

A	B	C	X
1	1	1	1
1	1	0	1
1	0	1	0
1	0	0	0
0	1	1	0
0	1	0	1
0	0	1	0
0	0	0	0

[4]

12 Statement:

Award marks as shown:

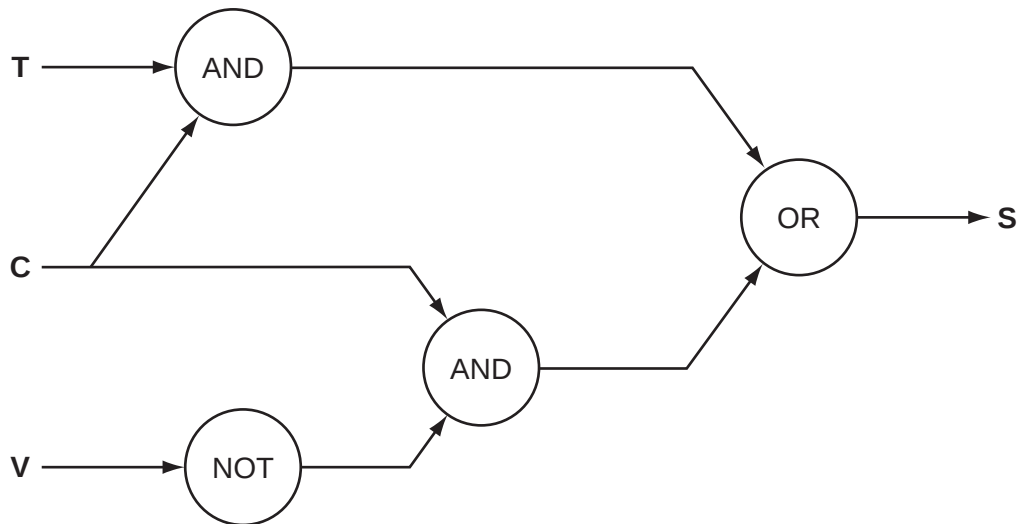
$S = 1$ if $[T = 1 \text{ AND } C = 1] \text{ OR } [V = \text{NOT } 1 \text{ AND } C = 1]$

← ----- 1 mark -----> ← ----- 1 mark ----->

[2]

Logic network:

Award **one** mark per correct gate:



[4]

Truth table:

Award **one** mark for each row showing correct 1-value in column S:

T	C	V	S
1	1	1	1
1	1	0	1
1	0	1	0
1	0	0	0
0	1	1	0
0	1	0	1
0	0	1	0
0	0	0	0

[3]

13 (a) **One** mark per device, **one** mark for type of memory and **one** mark for reason;

devices such as: USB flash memories
 MP3/4 players
 Cameras
 Mobile phones

memories such as: Solid state
 Miniature hard drives

reasons such as: Hard drives are removable
 Solid state – no need for battery back up

[6]

(b) Any **two** points from:

- use of a read head and write head working independently
- use of data buffers
- reference to special software to allow dual access

[2]

(c) Any **two** points from:

- different file formats used by the two systems
- protection built into the music files
- file corruption during download

[2]

14 (a) Any **two** effects from:

- safer to work force since less travelling involved
- much cheaper than paying for transport/accommodation
- changes in communications policies/philosophy
- faster response to issues where many people needed
- less stressed work force (thus more efficient)
- don't lose staff for several days whilst attending meetings

[2]

(b) Any **two** effects from:

- less environmental impact (less air travel)
- less travelling (so less stress)/less time away from home
- less social mixing with other personnel from other offices
- loss of "incentive" of foreign travel

[2]

15 (a) use of satellite technology [1]

(b) Any **one** from:

- can look for a landmark and then find street/road names
 - can see what roads really look like which helps when driving
- [1]

(c) Any **one** from:

- can type in 2 post/zip codes and get journey map
 - can see route highlighted on screen maps
- [1]

16 (a) **One** mark per reason

if two digits transposed e.g. **1 5** 2 8 instead of **5 1** 2 8

if one digit is incorrect e.g. 5 **4** 2 8 instead of 5 **1** 2 8 [2]

- (b) (i)

8	7	6	5	4	3	2	1	}		
8	1	3	9	1	2	0	7	}	1	
									}	mark
sum = 64 + 7 + 18 + 45 + 4 + 6 + 7 = 151									}	
divide by 11 gives 13 remainder 8									}	1 mark
thus number is not valid									}	1 mark
- (ii)

8	7	6	5	4	3	2	1	}		
5	5	0	3	1	6	1	7	}	1	
									}	mark
sum = 40 + 35 + 15 + 4 + 18 + 2 + 7 = 121									}	
divide by 11 gives 11 remainder 0									}	1 mark
thus number is valid									}	1 mark

[6]

17 (a) check digit [1]

(b) Any **two** points from:

date/time of flight
flight number
weight (in kg) of luggage
destination airport
intermediate airport(s)
passenger name
passenger address
departure terminal/airport
passport number

[2]

(c) Any **one** advantage from:

- can track whereabouts of luggage
- in case luggage is lost, can locate its history
- easier to ensure correct transfer of luggage if intermediate airport used

[1]

(d) Any **one** from:

supermarkets
smart ovens

[1]

18 **One** mark per sensor

automatic doors – infra red sensors
central heating – temperature sensors

[2]

19 Award marks as shown up to the maximum of 6 marks

```

best = 0

worst = 100                                     } 1 mark

total = sum = 0

for x = 1 to 3650                               } 1 mark
    input xchangerate                             } 1 mark
        if xchangerate > best then best = xchangerate } 1 mark
        if xchangerate < worst then worst = xchangerate } 1 mark
        if xchangerate > 2 then total = total + 1      } 1 mark
            sum = sum + xchangerate
next x
avge = sum/3650
output best, worst, total, avge                  } 1 mark

```

marking points:

correct initialisation	1 mark
correct loop and loop control	1 mark
correct input (inside loop)	1 mark
check on best and worst exchange rates	2 marks
counting number of occasions when rate exceeded 2.0	1 mark
finding the average value (sum inside loop and calc)	1 mark
correct outputs (all outputs AND outside loop)	1 mark

[6]