



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			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:

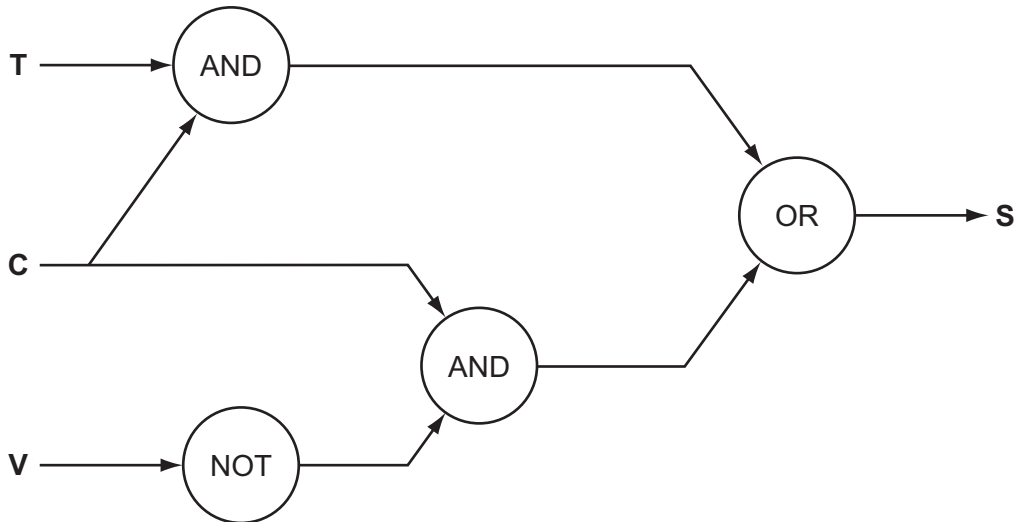
Award marks as shown:

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

←----- 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)
$$\begin{array}{r} 8\ 7\ 6\ 5\ 4\ 3\ 2\ 1 \\ 8\ 1\ 3\ 9\ 1\ 2\ 0\ 7 \end{array}$$
 }
 sum = $64 + 7 + 18 + 45 + 4 + 6 + 7 = 151$ } 1 mark
- divide by 11 gives 13 remainder 8 } 1 mark
- thus number is **not valid** } 1 mark
- (ii)
$$\begin{array}{r} 8\ 7\ 6\ 5\ 4\ 3\ 2\ 1 \\ 5\ 5\ 0\ 3\ 1\ 6\ 1\ 7 \end{array}$$
 }
 sum = $40 + 35 + 15 + 4 + 18 + 2 + 7 = 121$ } 1 mark
- 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 } 1 mark

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]