UNIVERSITY OF CAMBRIDGE INTERNATIONAL EXAMINATIONS
International General Certificate of Secondary Education

MARK SCHEME for the November 2004 question paper

0420 COMPUTER STUDIES

0420/01 Paper 1, maximum raw mark 100

This mark scheme is published as an aid to teachers and students, to indicate the requirements of the examination. It shows the basis on which Examiners were initially instructed to award marks. It does not indicate the details of the discussions that took place at an Examiners' meeting before marking began. Any substantial changes to the mark scheme that arose from these discussions will be recorded in the published *Report on the Examination*.

All Examiners are instructed that alternative correct answers and unexpected approaches in candidates' scripts must be given marks that fairly reflect the relevant knowledge and skills demonstrated.

Mark schemes must be read in conjunction with the question papers and the *Report on the Examination*.

- CIE will not enter into discussion or correspondence in connection with these mark schemes.

CIE is publishing the mark schemes for the November 2004 question papers for most IGCSE and GCE Advanced Level syllabuses.

Grade thresholds taken for Syllabus 0420 (Computer Studies) in the November 2004 examination.

	maximum mark available	minimum mark required for grade:			
		A	C	E	F
Component 1	100	65	43	27	20

The threshold (minimum mark) for B is set halfway between those for Grades A and C.
The threshold (minimum mark) for D is set halfway between those for Grades C and E.
The threshold (minimum mark) for G is set as many marks below the F threshold as the E threshold is above it.
Grade A* does not exist at the level of an individual component.

November 2004

INTERNATIONAL GCSE

MARK SCHEME
MAXIMUM MARK: 100
SYLLABUS/COMPONENT: 0420/01 COMPUTER STUDIES Paper 1

UNIVERSITY of CAMBRIDGE
International Examinations

(1) (a) MICR

any **two** from:
magnetic ink character (reader/recognition)
E13B character set
allows automatic data entry
scanner/device/bank, special ink = 0
example:
numbers on the bottom of a cheque, draw characters **[2]**

(b) batch processing

any **two** from:
processing does not start until all data collected
reference to JCL
no need for user interaction
example:
payroll system
electricity/gas/water (etc.) billing
cheque processing **[2]**

(c) modem

any **two** from:
modulator-demodulator
converts digital/data to analogue (and vice versa)/converts binary into sound
allows communication over telephone lines
(NOT a converter, device)
example:
surf/connect to the net **[2]**

(d) virus

any **two** from:
program/software
which replicates/copies itself
damages files/corrupts files/corrupts boot sector
corrupts memory
stops computer working, stops proper functioning = 0
examples:
worms, Trojan horse, time bomb, logic bomb [1 example only] **[2]**

(e) interrupt

any **two** from:
a signal/request generated by a device/program
causes a break in the execution of a program/stops the program
two devices=0
example:
reference to printer **[2]**

(2) Any **three** from:
automatic re-ordering is possible
easier stock taking/automatic stock taking
easier to identify correct part
fewer errors (in obtaining correct part, on input, etc.)
need for fewer people in the stores
easier to locate part/automate stores
out of date parts can be automatically identified
no need to remember prices (supermarkets)/no need to put price on goods
faster data entry/no need to key in
easier to do price changes
prevents/reduces stealing
shorter queues=0
less storage space used = 0
itemised receipts = 0
information held on the bar code = 0
(easier/faster = 0 unless qualified) **[3]**

(3) **(a)**

feasibility study	}	
	}	1 mark for both in correct order
analysis	}	
design	}	1 mark
implementation	}	
	}	1 mark for both in correct order
evaluation	}	

[3]

(b) any **two** from:
systems flowchart/block diagram
design data capture forms/input methods/user interface
select/design appropriate hardware
select/design appropriate software/write programs/algorithms
design screen displays
design reports/output
design files/tables/records/validation rules
design test plan/test strategy
design (on its own) = 0
(NOT interviews, questionnaires, look at system etc.) **[2]**

(4) **(a)** any **two** from:
data/images can be transferred/imported automatically/faster
image can be manipulated/viewed straight away/no need to develop
can store considerably more data/photos
can store other info (apart from photo image) e.g. road conditions
chips can be re-used
more reliable, more robust, safer = 0 **[2]**

(b) any **two** from:
calculate/sense/collect (or record) speed of vehicle
compare speed of vehicle with stored value(s)/decide whether photograph should be taken
check on value of light intensity/adjust focal length/focus image/adjust shutter speed/set exposure - (**) **[2]**

(c) any **two** from:
log time/date/speed/road conditions
operate "flash"
operate shutter
store image
check on value of light intensity/adjust focal length/focus image/adjust shutter speed/set exposure – (**) **[2]**

(** - only award this mark once either in part **(b)** OR part **(c)**)

(5) Any **three** from:
sound (voice) output/speech synthesiser
speech (voice) input/recognition/microphones
large characters on the screen
braille keyboards/touch screens/touch pads/larger keys/other special keyboards
use of bright colours to improve visibility
scanners to input information and output speech
printers which give output in Braille
touch typing = 0
multimedia, games, animation=0 (unless qualified wrt question) **[3]**

(6) **(a)** any **two** from
stores data/information being sent to printer **temporarily**
compensates for difference in speed of CPU and printer
allows CPU to carry out other tasks whilst printer is printing **[2]**

(b) any **one** from
reduces the number of data transfers to the printer
more efficient use of the CPU
larger files can be sent to the printer **[1]**

(7) **(a)** (B2 – C2) * D2
< - 1 mark -><- 1 mark -> **[2]**

(b) any **two** from:
highlight E2 and select copy
paste in cells E3:E5
(or equivalent using, for example, drag and drop formula) **[2]**

(c) any **two** from:
use of graphs
description of how graph used
showing data in additional columns of the spreadsheet
use of other formulae
such as, for example, (B3-F3)/C3 to estimate days
number of days column (on its own) = 0 **[2]**

(8) **(a)** any **two** from:
illegal copying of software/software piracy
sending viruses
hacking into systems/altering information illegally
fraud/improper transfer of funds/data theft
sabotage/malicious damage
mis-use of data = 0
blackmailing = 0 (unless qualified) **[2]**

(b) any **three** from:
data encryption
use of passwords/access codes/PIN
software security built into system/use of firewalls
anti-virus software
log users/computer use
software security built into system
use call back facility for incoming information
take/check references of potential staff
divide jobs between several people/supervise staff
physical locks
use of laws/back ups = 0 **[3]**

(9) any **three** from**:**
file management
input/output control
spooling
memory management
multi-tasking/JCL
multi-programming
handling interrupts
error reporting
security
interface with user/use of WIMP
load/run programs
processor management **[3]**

(10) **(a)** any **two advantages to customer** from:
can easily search for the cheapest offer
don't need to leave home/more time to choose
can shop any time (24/7) - **
save on travelling costs
more choice available
can do shopping by setting up a file
no need to carry cash, can use credit card = 0 **[2]**

(b) any **two advantages to shop managers** from:
potentially greater number of customers/wider audience/hyperlinks
increase in sales
more goods can be made available
can sell at any time - **
cheaper – no leaflets, etc.
can reduce number of shops on the high street/no need for shops
can employ fewer staff
no need to be in the shop/can run business from home
less queues, better presentation = 0 **[2]**

(** only accept this answer in **(a)** OR **(b)**)

(c) any **three disadvantages** from:
no interaction with people
fear of rogue companies/might not receive goods
cannot see the goods first
not everyone has a computer
not everyone has a credit card
need for further technological advances
fear of hacking/card fraud
delay in delivery of goods, high transport costs = 0 **[3]**

(11) any **three** from**:**
faster/easier access
direct/random access
easier to update disks
more robust
reference to memory size = 0 **[3]**

(12) Output values:
9 (or b)
8 (or c)
4 (or b)
Accept only one answer per line **[3]**

(13) **(a)** **length check** – to ensure up to 30 letters of alphabet only
character check – to ensure name doesn't contain numeric characters **[2]**

(b) **range check** – to ensure marks are within correct boundaries (e.g. between 0 and 100)
length check – to ensure no more than 3 digits are input
type/character check – to ensure number is numeric **[2]**

(NOTE: in both above parts, presence checks and check digits = 0)

(14) **(a)** any **two** from:
no need for the company to transport staff around/safer for employees
saves time since less travelling
saves travelling costs/saves accommodation costs
no need to leave home/office
easier for several delegates to take part simultaneously
body language = 0, faster/saves time (on its own) = 0 **[2]**

(b) easier to send copies of same document to several people
no need for stamps
electronic copy held, but with phone call no copy held/auto confirmation
easier to send files/spreadsheets/databases
can read at any time
cheaper than normal post service
faster than normal post service
time differences around the world will not cause a problem
faster, cheaper (on its own) = 0
reference to attachments = 0 (unless qualified e.g. it is easier to send files as attachments …….) **[2]**

(c) any **two** from:
people print out copies for meetings and then destroy them afterwards…..
…. but if needed again, print out another copy (both lines = 1 mark)
some people find it difficult reading large amounts of text on the screen
people often e-mail colleagues rather than use the phone who then print out the document **[2]**

(15) **(a)** any **three** steps from:
gather information from experts in the field
create/design knowledge base
input data into knowledge base
design/create rule base
create/design interrogation technique/questions and answers/inference engine
create/design display of results/user interface
(databases = 0 marks) **[3]**

(b) any **two** from:
no need for an expert to be present
can act as a prompt to an expert
can deal with complex situations much faster than humans
could be used in hazardous areas (e.g. oil prospecting)
less likely to make an error
more consistent in diagnosing faults/more accurate
(cheaper = 0) **[2]**

(c) any **one** from:
medical diagnosis
mineral prospecting
chess
tax/financial calculations
weather forecasting
fault diagnostics
criminology/forensic science
career choices
(names of expert systems = 0) **[1]**

(16) (a) any **two** from:
draw geometrical shapes/colour fill
zoom/rotate/scale/crop/skew
three dimensions/layers
use of simulations
can do calculations e.g. costing of components, stress, volumes
link to CAM
store/retrieve drawings/images
library of components/templates
labelling/adding text **[2]**

(b) **graph plotter** – to produce high quality drawings/plans in various paper sizes (reference to graphs = 0, prints out = 0)

graphics tablet – to provide interface for drawing on the screen/links with the light pen

light pen – to make alterations on the screen to the drawings/write directly on the screen/select commands

trackerball – draw designs/select options from menu **[4]**

(17) (a) (i) any **one** example of numeric field
(1 mark for name of field + description, 1 mark for field length)

name of field	description	field length
ENGSIZE	engine capacity (litres)	4
NUMDOOR	number of doors	1
FUELCON	economy of vehicle	3
PRICE	cost of vehicle	6
ODOMETER	recorded distance (km or miles)	7

(ii) any **one** example of text field

name of field	description	field length
COLOUR	colour of vehicle	20
MODEL	make and model of vehicle	20
PREVOWN	details of previous owner	50
OPTION	list of extras on vehicle	30

[4]

(b) any **one** example for each operation:

amend
information is incorrect
price of vehicle needs to be changed (e.g. sales)
change of colour

delete (record deleted)
vehicle sold
vehicle scrapped

insert (info into a field)
new vehicle arrived
more information about current vehicle becomes known

[3]

(18) **(a)** any **two** from:
pressure sensor
temperature sensor (thermometer)
radiation sensor/detector
escaping gas sensor/detector **[2]**

(b) ADC (analogue to digital converter)
DAC, modem = 0 **[1]**

(c) any **three** points from:
output affects the input
data from sensors sent to computer
data compared with stored values
computer sends information to valves (etc.) to control gases
reference to loop in control program
reference to heaters/coolers = 0 **[3]**

(d) any **two** from:
can monitor/control process remotely/at a distance
safer way of operation/less danger to humans
computer is faster at diagnosis/taking necessary action
ability to automatically analyse data/produce graphs
less need for human intervention/24 hour monitoring/workers get tired
more accurate control **[2]**

(19) Sample answer:

```
repeat
        input start_point                                  }
        input end_point                                    }        1 mark
        input number                                       }
        cost = abs(start_point - end_point) * number * 2   }        2 marks
        if number >= 3 then cost = cost – (cost/10)        }        1 mark
        input money                                        }        1 mark
        change = money – cost                              }        1 mark
        for x =   1 to number                              }
                  print ticket                             }        1 mark
        next x                                             }        1 mark
        output change                                      }
until no more customers                                    }        1 mark
```

General marking points:

(initialisation = 0)

inputs – 1 mark

calculate how many stations to charge for – 1 mark

formula/if statement to calculate cost for ticket/no discount - 1 mark

formula/if statement to calculate discount where appropriate - 1 mark

input money - 1 mark

formula to calculate change - 1 mark

loop to control number of tickets to be printed - 1 mark

print ticket/output change - 1 mark

overall loop control - 1 mark

[6]