UNIVERSITY OF CAMBRIDGE INTERNATIONAL EXAMINATIONS

International General Certificate of Secondary Education

MARK SCHEME for the May/June 2009 question paper

for the guidance of teachers

0420 COMPUTER STUDIES

0420/01 Paper 1, maximum raw mark 100

This mark scheme is published as an aid to teachers and candidates, to indicate the requirements of the examination. It shows the basis on which Examiners were instructed to award marks. It does not indicate the details of the discussions that took place at an Examiners' meeting before marking began, which would have considered the acceptability of alternative answers.

Mark schemes must be read in conjunction with the question papers and the report on the examination.

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CIE is publishing the mark schemes for the May/June 2009 question papers for most IGCSE, GCE Advanced Level and Advanced Subsidiary Level syllabuses and some Ordinary Level syllabuses.

1 Generally, one mark per valid point.
Two different types of example can gain two marks.

(a) batch processing
data collected together
during time period
processed all at once/in one go
ref to JCL
no need for human intervention
done at night/off peak
e.g. cheques, utility billing [2]

(b) data logging
automatic capture/sampling/gathering ….
… and storing/recording of data/readings
data from sensors
devices contain ROM and RAM type memories
e.g. weather conditions, temperature readings in an experiment [2]

(c) video conferencing
form of electronic comms using the Internet/WAN/ISDN link
requires webcam/microphone/speakers
image taken by webcam appears on window in participant's monitor
uses video compression software
use of codec (analogue-digital translation)
e.g. meetings that include delegates at different locations [2]

(d) virtual reality
computer simulation
in a 3D world
uses special interactive devices such as goggles, data gloves, suits,…
makes user "feel as if they were actually there"
operates in real time
e.g. viewing houses, inside chemical plants, flight simulators, games [2]

(e) virus
program/software
which copies itself/replicates
created to corrupt/do damage to files/system/boot sector/data
spread through email attachments/floppy disks/CDs/USB drives [2]

2 Any **three** types of device from:
bar code reader/scanner
document scanner
magnetic stripe reader
smart card reader
finger print reader
retina scanner
microphone
digital (video) camera
OCR
OMR
MICR
RFID reader (radio frequency identification – used in electronic tagging) [3]

3 **(a)** Any **three** features from:
file management/delete/copy/save/load files
memory management
I/O control
error messages/handling
interrupt handling
user interface
security issues
logging on/off
accounting/user account management
time slicing
multi access
multi-tasking
JCL/job control
network management [3]

(b) **(i)** any typical device such as a microwave oven [1]

(ii) any **one** reason from:
has only one set of tasks to perform
simple input expected (e.g. keypad on front of device)
simple, never-changing hardware
would increase development and manufacturing costs [1]

4 **(a)** signal that temporarily stops execution of a program [1]

(b) any **one** from e.g.:
by a key stroke (e.g. BREAK key)
by a printer (e.g. out of paper error)
fault in program when running (e.g. try to divide by zero)
end of an operation (e.g. end of time slice) [1]

(c) handshaking [1]

5 **(a)** any **two** points from:
CAD is computer aided design
allows engineers and architects to design/model/test new products
uses special hardware such as hi res large screens, plotters, spaceballs
makes use of features such as 2D, 3D, wire frames, costing, zoom
references a library of spare parts
links into CAM [2]

(b) any **two** examples from design of e.g. :
aerospace
architecture
vehicles
consumer goods
circuits
ergonomics
fashion
kitchens/bathrooms
lighting at concerts
(chemical) plant/factories [2]

6 any **three** advantages and **one** disadvantage from e.g.:
immediate (almost instantaneous) arrival of email in recipient's inbox
can send attachments
easy to send out same message to several recipients
can leave message in recipient's mail box to be read later
can pick up emails anywhere in the world
can forward email without retyping it

hacking is now a possibility/possibility of viruses (…but encryption minimises risk)
lots of unnecessary messages (e.g. "I'm home!!!")
unsolicited mail
some "dodgy" email material
need computer equipment/Internet connection/email address
attachments may be too large
recipient may not be able to open an attachment
recipient cannot receive original documents

(NOT reference to costs or less paper used) [4]

7 any **four** from:

hacking into his computer and change/read files
viruses could be sent
somebody "tapping into" his WiFi system
credit card details being stolen
bogus web sites
stealing his computer (with security information on hard drive, for example)
physical eavesdropping in a public place/shoulder surfing
driving round looking for wi fi access/ WarDriving [4]

8 **(a)** any **two** from:
need to re-train
de-skilling
possible loss of jobs/redeployment
loss of social interaction [2]

(b) any **one** from:
reduced costs to the company because of e.g. fewer staff/less office space
can offer 24/7 customer services
can advertise/offer new services and products automatically
can recruit staff from anywhere
standard responses to common queries [1]

(c) any **two** from:
24/7 query system
can see circuit diagrams etc. on screen
can printout answers to take away/save and view again
much faster response time (phone often busy, ….)
less expensive (overseas phone calls to the company could be costly)
don't get conflicting advice/get correct response [2]

9 **(a)** any **three** from:
can animate human movements to give more realism
e.g. computer can "move" mouth properly to mimic speech
use of avatars
faster to produce the required number of frames
.....takes **many** artists a long time to do the drawings
tweening speeds up the process
editing/adjusting animations is easier/faster
rendering to give more realism
no need for any film/can store straight to CD/DVD [3]

(b) There are various ways of completing this calculation, the following is one example:
number of images needed = 30 x 25 x 60 = 45,000

memory needed = 45,000 x 400 x 1000 bytes = 18,000,000,000 bytes
18,000,000 Kbytes
18,000 Mbytes
18 Gbytes

(1 mark for showing a **correct** method of working out plus 1 mark for **correct** answer including units) [2]

10 any **four** point from:

get information from experts
input data into knowledge base
populate rules base
create inference engine
create human-machine interface/question-answer sessions
test system with "known" problems and solutions
create output screens/format
create/design validation routines [4]

11 **(a)** (D2) = C2 – B2
(D2) = (C2 – B2) [1]

(b) (D10) = AVERAGE(D2:D9)
(D10) = SUM(D2:D9)/8
(D10) = (D2+D3+D4+D5+D6+D7+D8+D9)/8 [1]

(c) (F10) = MAX(F2:F9) [1]

(d) select D2 and + appears
drag down to D9

OR

select D2 and select copy
select D3 – D9 and select paste

OR

select/highlight D2 down to D9
select Auto/fill down [2]

(e) (D1/D2 to D7/D8/D9)
AND
(E1/E2 to E7/E8/E9)

Note: (D1/D2:E7/E8/E9) is worth 2 marks [2]

(f) any **two** from:
continuous (24/7) monitoring
no need for human operators
can run more experiments
less chance of mistakes
results/graphs will be produced without delay
won't miss any "unusual" data [2]

12 (a) any **two** from e.g.: AND any **two** matching points from:

assembling cars etc.	}	consistency of build/repeatability
paint spraying	}	faster in operation than humans
	}	can work without breaks/24-7
	}	health & safety
bomb disposal	}	no danger to human life
going into dangerous environments	}	equipped with sensors (can pick up data
	}	automatically)
vacuum cleaners/mowers	}	more leisure time for people

[4]

(b) any **two** from:
any task requiring creativity (writing original prose, music, etc.)
any task where logic/rules of programming can't be applied
one off task e.g. complex glass blowing [2]

13 (a) any **two** from:
shopping basket
checkout facility/form for customer details
secure buying when using credit card
"when customers booked X, they also booked Y" facility
search facilities for artist
drop down boxes to choose type of concert/ticket/prices
calendar for dates
(interactive) seating plan
(interactive) map/directions
help facilities
currency conversions
data/sales confirmation by email
saved customer details/customised pages
ability to listen to video clips of previous concerts
recognise customer as soon as they log onto the site
hyperlinks to other sites/navigation buttons
bookmarking [2]

(b) email + (attachment)
text message
printable page from web site [1]

(c) (i) each barcode/reference number for the concert is different [1]

(ii) any **one** from:
link bar code/reference number to customer's credit card
send PIN/id with email to uniquely identify customer
ask customer for proof of identity [1]

14 (a) 120
1 [2]

(b)
```
for X = 1 to N + 1        OR      repeat              OR      while X <> N + 1 do
    (T = T * X)                       (T = T * X)                   (T = T * X)
                                      X = X + 1                     X = X + 1
next X                            until X = N + 1                 endwhile
```

(1 mark for correct first line of loop construct)
(1 mark for correct loop control and last line of loop construct) [2]

15 (a) use of sensors
use of ADC (if necessary) [2]

(b) any **two** from:
doesn't get tired/works 24-7
less likely to make mistakes
can respond to situations more quickly
less chance of mis-understanding or mis-interpreting data [2]

(c) any **two** from:
in case computer program goes wrong/computer malfunction
passenger confidence
any "unusual" manoeuvres still best done in manual mode
in case of emergencies [2]

(d) any **one** from:
faster processors
greater component reliability
considerable component (e.g. microchips) price reductions
increased complexity of aeroplanes
reduction in size of components
reduction in power consumption [1]

(e) any **two** from:
flight plan keyed in
satellite/global position read by computer (frequently)
computer checks expected position based on time
changes course if necessary…..
…. by sending signals to the ailerons
…. electric motors change aileron angles etc.
operates in real time [2]

(f) (i) any **one** from:
passenger name/passenger ID
destination(s)/point of departure
flight id [1]

(ii) any **one** from:
tracking/uniquely identifies baggage/ensures baggage gets to right place
increased security
links to passenger/ensures luggage cannot travel without passenger [1]

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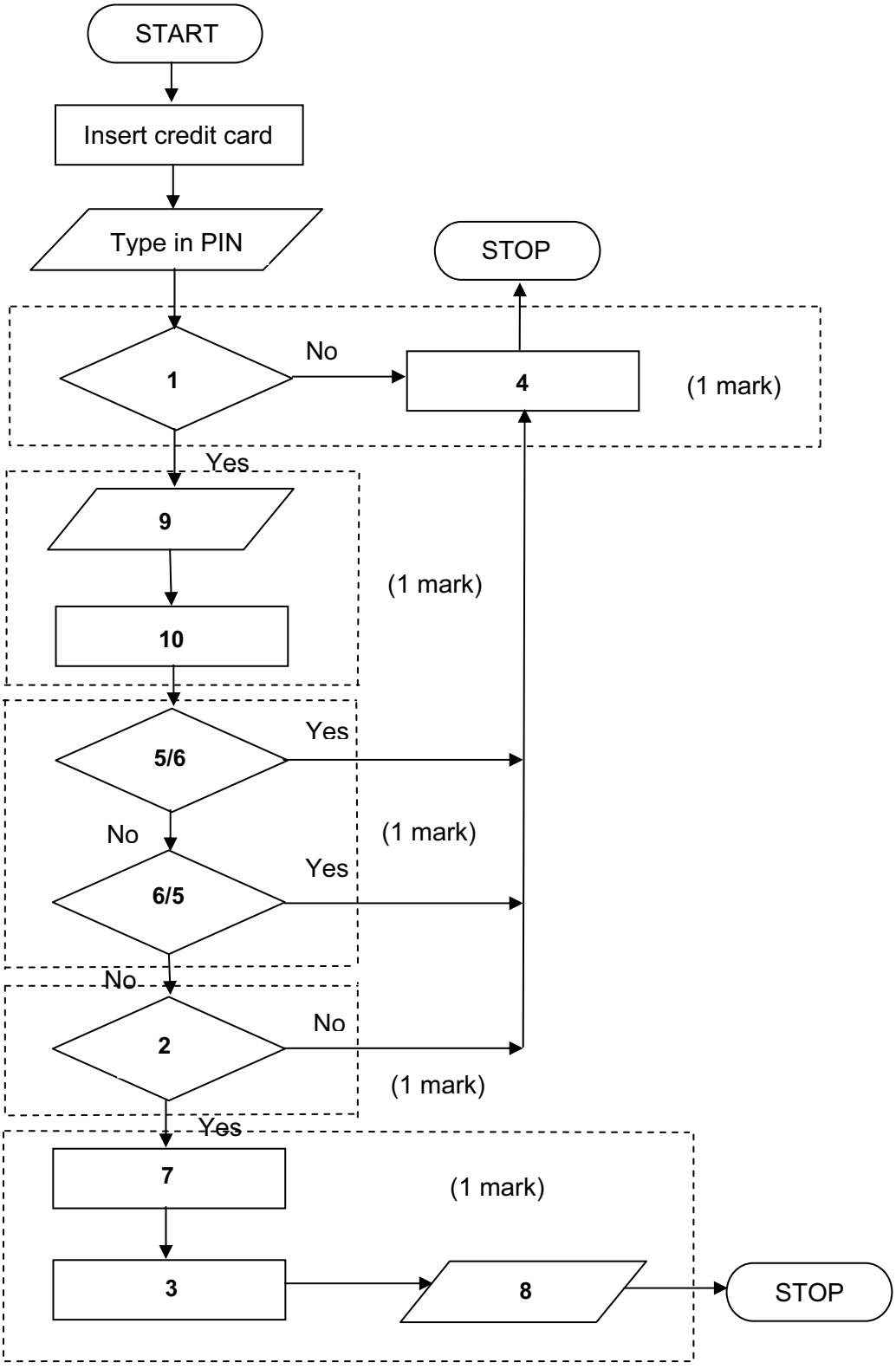

[5]

17 **(a)** 5 [1]

(b) **(i)** Customer Reference

(ii) Specification [2]

(c) any **two** from:
reduces typing errors
uses less memory
faster to type in
quicker to sort
store in one field
easier to validate [2]

(d)

Car Description/Car Ordered	VW Golf	}
Delivery Date	Dec 2008	} New Car Sales
Specification	21215168	}

Customer Name	D Khan	}
Customer Address	19 Main Street	} Customer Details
Trade In	Yes	}

(**1 mark** 1 field name **and** contents from New Car Sales table **plus** 1 field name **and** contents from Customer Details table)

List of Extras	B D E F J L	}
Cost Price ($)	21 000	} Car Manufacturer

(**1 mark** 1 field name **and** contents from Car Manufacturer table) [2]

(e) any **one** advantage from:
later use if customer wants to trade in again in 2 or 3 years' time
can send out new product information
if safety/recall issues from car manufacturers
service/safety check reminders [1]

18 marking points (1 mark per item up to the maximum of 5):
initialise fa, sj and ka to zero
correct loop
inputs (in correct place)
addition of number of flights per airline
any validation checks carried out
calculate percentages
outputs (in correct place and ONLY if some evidence of any attempt at processing)

sample program/algorithm

```
fa = 0; sj = 0; ka =0;                                  } 1 mark

for x = 1 to 400                                        } 1 mark

    input lettercode                                    }
                                                        } 1 mark
    input numbercode                                    }

        if lettercode = "FA" then fa = fa + 1           }
                                                        }
        if lettercode = "SJ" then sj = sj + 1           } 1 mark
                                                        }
        if lettercode = "KA" then ka = ka + 1           }

        else print "error"                              } 1 mark

next x

fapercent = fa/4                                        }
                                                        }
sjpercent = sj/4                                        } 1 mark
                                                        }
kapercent = ka/4                                        }

print fapercent, sjpercent, kapercent                   } 1 mark        [5]
```

Sample flowchart: