UNIVERSITY OF CAMBRIDGE INTERNATIONAL EXAMINATIONS

International General Certificate of Secondary Education

MARK SCHEME for the May/June 2007 question paper

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.

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.

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1 (a) virus any **two** points from:

program/software
which replicates/copies itself
alters/damages files/alters files or data
e.g. examples of the effect of a virus

worm = 0
trojan horse = 0
name of virus = 0
bomb = 0

[2]

(b) verification
any **two** points from:

check on input for errors/checking before & after transfer
by double entry
on screen checking
comparing input/use of second operator
e.g. password typed in twice

proof reading = 0

[2]

(c) interrupt
any **two** points from:

a signal/request generated by a device/program
causes a break in execution of a program/stops program
e.g. printer out of paper

power cut = 0

[2]

(d) simulation
any **two** points from:

studying behaviour of a system
by using a model/represents real life/mathematical representation
results can be predicted
e.g. flight/other simulator, modelling hazardous chemical reaction

games = 0

[2]

(e) electronic scabbing
any **two** points from:

allows managers to switch …
word processing/computer processing duties …
from striking clerks in one country to non-striking clerks in another

[2]

2 Any **two** types from:
(1 mark for naming type of test data. 1 mark for description or suitable example)

Normal - acceptable/valid data
- data has expected outcomes
- example (e.g. day of month 1 to 31) needs context, range OK

Abnormal - data outside limits of acceptability/validity
Erroneous - example (e.g. day of month –1, 50, etc.)

Extreme - data at limits of acceptability/validity
Boundary - example (e.g. day of month 1, 31, etc.) [4]

3 **Two** points **one** from each group:

speech recognition is a form of input;
speech recognition requires a microphone;
speech recognition is an example of an expert system

speech synthesis is a form of output
speech synthesis requires speakers
in speech synthesis words are chosen from a database [2]

4 Any **three** points from:
file management resource management = 0
input/output control/peripheral management
spooling
memory management
multitasking/JCL/batch processing
multiprogramming
handling interrupts
error reporting/handling
security
interfaces with users/WIMP type interfaces
loads/runs programs
processor management
manages user accounts
copy/save/format/DOS utilities [3]

5 **(i)** Any **one** advantage and any **one** disadvantage from:

advantages	**disadvantages**
no travel (∴ saves money)	too many distractions
no time wasted in travelling	less social interaction with others
more time for family life	less visible status for senior employees
more flexible working hours	
equal opportunities for all	
more motivated (**)	

(ii) Any **one** advantage and any **one** disadvantage from:

advantages	**disadvantages**
lower overheads (no offices)	less control over work force
more flexible/contented (**) work force	could be doing work for more than one company
easier to employ disabled people	difficult to get company loyalty
workers can be anywhere in the world	more difficult to react quickly to changing situations
can tap into world wide expertise	

(** - only allow in **(i)** OR **(ii)** not both) [4]

6 One mark for name and one mark for description

Data flow diagrams	- describes data input/output into the system - shows what happens to data within the system (during processing and storage)
Modules/Structure Diagrams/	- shows logic behind program structure - allows task to be split into individual parts - shows links in modules
(Systems) flowcharts/ diagrams	- shows hardware - shows how hardware links - shows how processes are carried out
Gantt/Pert charts (critical path analysis)	- shows each stage with deadlines/milestones

[2]

7 **(a)** Any **three** points from:

deskilling
retraining needed
loss of jobs
frees staff from admin jobs
less time wasted looking for lost paperwork [3]

(b) Any **two** from:

passwords (changed regularly) — encryption = 0
use of ids/log on ids/user names — removal of external memory = 0
firewalls
physical measures (e.g. locked rooms)
logging off after use [2]

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

use of back up files
generations of files (GFS) [1]

(d)

amend	- change name/address/doctor etc. - new illness - re-admission	change of age = 0
delete	- patient leaves area/country - patient dies	leaves hospital = 0
insert	- new patient arrives - new baby born	

[3]

8 **(a)** Any **two** from:

transfer images directly to computer (no need to scan in)
can easily wipe photos from memory — video possible = 0
view pictures immediately
adjust pictures immediately
store more pictures in <u>less space</u> [2]

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

number of pixels/memory size
the sensor (determines number of pixels) [1]

9 **(a)** 7
5

(b) 10110110 [1]

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

Notes lift is going down
Notes required floor is less than present floor
Sorts remaining numbers into descending order of floors [3]

10 **(a)** **(i)** Any cell in the range A2:D6

(ii) Any cell in the range A1:F1, C7, D7 [2]

(b) (B2*5) + (C2*10) + (D2*20)

(-1 for each error) NB Brackets not needed [2]

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

Highlight/select E2/copy E2
paste into cells E3 to E6

(or equivalent (select + sign) using drag and drop, for example) [2]

(d) SUM(E2:E6)
E2 + E3 + E4 + E5 + E6 [1]

(e) N [1]

11 (a) 2
4
1 [1]

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

computer check on input data — check data is wrong/correct = 0
detects any data which is incomplete or not reasonable

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

length check – e.g. only 30 characters in name field
character check – e.g. name doesn't contain numeric chars
range check – e.g. day of month in date is between 1 and 31
format check – e.g. date in the form xx/yy/zz
check digit – e.g. end digit on bar code to check if it is valid
type check – e.g. integer, real
(presence check = 0) [2]

12 Any **three** points from: (NB if disability mentioned, shouldn't conflict with method/device)

large/concept keyboards/switches
braille keyboards (for partially sighted/blind)
tracker ball to move pointer if keyboard/mouse can't be used
touch screens (using head wands)
software to predict words (e.g. for dyslexic people)
speech recognition
foot activated control (if no arm movement)
large icons/fonts on screens (– if partially sighted)
braille printers
speech synthesis — speakers = 0
large screen
choice of colours [3]

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

know prices of each item/check errors
proof of purchase
can check totals themselves
can check items [2]

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

using bar code reader/scanner/wand/gun to read bar code
key in/type in/enter manually the number under the bar code

laser = 0
light pen = 0 [2]

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

bar code read
item identified on the file
number of items reduced by 1 each time item is sold
when new item come in/returned stock level increased by 1
minimum stock level stored on file
if stock level less than minimum/reorder level …
… automatic re-ordering done alert that stock low = 0 [3]

14 (a) 9 [1]

(b) 1023, 1911, 3456, 2516
(-1 for each ref number missing or for each incorrect ref number) [2]

(c) Ignore case, comma 7
(**Price($)** > 60000) AND (**0-100 kph time (sec)** < 7.0)

<------ 1 mark ----> <---------- 1 mark ---------->

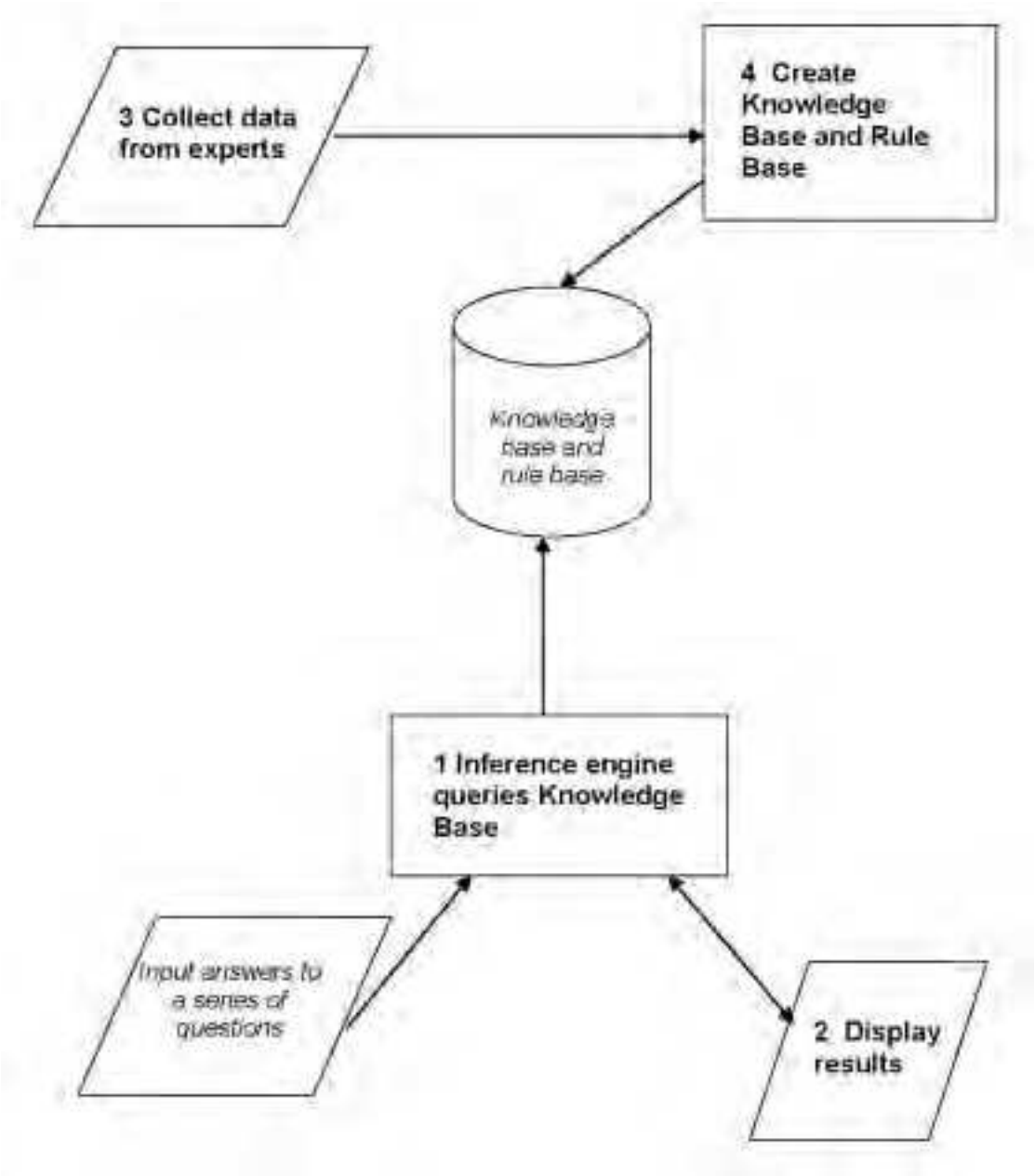
(**0-100 kph time (sec)** < 7.0) AND (**Price($)** > 60000)

<---------- 1 mark ----------> <---------- 1 mark --------> [2]

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

bigger audience/world wide audience
no need to advertise in the press (∴ cheaper) no showroom = 0
can have automatic replies to customers
open 24/7 [2]

15 (a) 1 for each correct box **max 3**



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

multiple choice questions
yes/no answers
takes user through the possible options
touch screen with options [1]

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

possible faults
% probability of the fault [1]

(d) Any **one** from:

e.g.
chess
oil/mineral prospecting
tax/financial calculations
medical diagnostics
speech recognition
rock identification [1]

16 (a) Any **two** sensors from:

airflow (mass of air) — fuel level = 0
oxygen/gas sensor — heat sensor = 0
throttle/accelerator position/potentiometer — thermometer = 0
temperature
voltage
(manifold) pressure
(engine) speed [2]

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

data from sensors fed to ADC
data is fed continuously (loop)
ADC converts data to digital form and sends information to ECU
ECU has been programmed/stored with key values/data
information from sensors compared with stored data
signals sent to injectors to alter their operation as required
reference to need for DAC
reference to need for actuators [3]

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

environment (exhaust gases controlled)
(better) fuel economy/more efficient
fewer moving parts
doesn't go "out of tune" — improved engine life = 0
fuel injection more accurate [1]

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

requires an immediate response
needs to be on-line [1]

17 Any **three** features from:

links to associated resources possible within text (hyperlinks)
hot spots – in pictures/maps
forward/back buttons – allows review of resources
favourites – maintains links to resources between sessions
history – previous searches for example
refresh – updates pages for example
filters – takes out unwanted information for example [3]

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

huge amount of information
information is constantly updated
immediate access to information from research papers
use of search engines
e-mail facilities give access to world experts

Any **one** disadvantage from:

need to know how to do searches properly
bad searches can give wrong or irrelevant information
unknown reliability
likely to download virus
phone lines engaged if not using broadband (OK if not given in **(b)**)
(open to) fraud/hacking while on line [3]

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

very fast transfer (ideal for video clips) speed of internet connection = 0
always “on” (no need for dial up)
not metered
telephone lines not tied up/don’t need extra lines (if not given in **(a)**) [1]

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

(NOT advantages of laptop computers)

no trailing wires
can sit anywhere within the room

Any **one** disadvantage from:

slower transmission speed
range is limited
security problems
health problems [2]

19 General marking points:

loop – 1 mark
input in correct place – 1 mark
checks on code – 1 mark
correct use of **if/then/else** or **case** statements – 1 mark
increment all totals – 1 mark
error recognition/validation – 1 mark
correct output in correct place – 1 mark [5]

Sample program 1:

```
set c, d, v, b = 0: set count = 0
repeat                                                    1 mark
        input code                                        1 mark
        x = code/10000                                  }
        y = INT(x)                                      }  1 mark
        if y = 1  then c = c + 1                        }
                  else if y = 2 then d = d + 1          }
                  else if y = 3 then v = v + 1          }  2 marks
                  else if y = 4 then b = b + 1          }
                  else print "error"                      1 mark
        count = count + 1
until count = 5000
print c, d, v, b                                          1 mark
```

Sample program 2:

```
set c, d, v, b = 0: set count = 0
repeat                                                    1 mark
        input code                                        1 mark
        if code >= 1000 and code < 2000 then c = c + 1  }
        else if code >= 2000 and code < 3000 then d = d + 1  }
        else if code >= 3000 and code < 4000 then y = y + 1  }  3 marks
        else if code >= 4000 and code < 5000 then b = b + 1  }
                  else print "error"                      1 mark
        count = count + 1
until count = 5000
print c, d, v, b                                          1 mark
```

(NOTE – OK to use statements such as *if code begins with a 1* as code checks)