UNIVERSITY OF CAMBRIDGE INTERNATIONAL EXAMINATIONS

International General Certificate of Secondary Education

MARK SCHEME for the May/June 2010 question paper

for the guidance of teachers

0420 COMPUTER STUDIES

0420/12 Paper 12, 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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1 (a) **buffer**
Any **two** points from:
–   temporary …
–   … storage/memory
–   compensates for the difference in speed of peripherals and CPU
–   e.g. printer (buffer)   [2]

(b) **batch processing**
Any **two** points from:
–   processing doesn't start until **all** data is collected
–   JCL (any *reference to Job Control Language)*
–   no need for user interaction
–   processed all in one go
–   done at "quiet" times
–   e.g. billing, payroll, cheque processing   [2]

(c) **e–commerce**
Any **two** points from:
–   electronic commerce
–   buying and selling products/services …..
–   ….. using the internet/computer networks
–   reference to B2B (business to business)
    or B2C (business to consumer/customer)
–   e.g. on-line shopping, commodity exchanges, Internet/online banking   [2]

(d) **simulation**
Any **two** points from:
–   studying the behaviour of a system
–   by using a model/mathematical representation
–   results can be predicted
–   e.g. flight (or other) simulator, modelling hazardous chemical processes
–   e.g. 10-pin bowling computer game   [2]

(e) **email**
Any **two** points from:
–   electronic mail
–   sending messages from one device to another using computer networks/Internet
–   world wide form of electronic communication
–   can send file attachments
–   e.g. sending a letter without use of traditional mail service   [2]

2   (a) Any **three** points from:
   –   loss of jobs/unemployment
   –   deskilling
   –   need to re-train
   –   different jobs available/re-skilling
   –   no longer need to do hazardous/tedious jobs   [3]

   (b) Any **two** points from:
   –   lower work force costs (no salaries to pay)
   –   lower environmental costs (less electricity for heating/lighting)
   –   higher throughput
   –   more consistent product
   –   robots don't need breaks, holidays/work 24/7 etc.
   –   robots don't take industrial action   [2]

   (c) Any **one** point from:
   –   tasks repeated by skilled worker and how each task is done is memorised
   –   tasks programmed directly into the computer/robot memory   [1]

   (d) Any **one** point from:
   –   if parts missing for a sequence, then a warning should be given and the assembly stopped
   –   several quality control stages to spot an error early on
   –   program in checks at each stage of assembly so robots can detect a fault immediately [1]

3   Any **four** points from:
   –   understand the current system
   –   produce data flow diagrams/system flowchart
   –   identify user/client requirements/objectives
   –   interpret user/client requirements/objectives
   –   agree requirements/objectives with the user/client
   –   collect data from the current system
   –   fact finding (e.g. questionnaires, interviewing, etc.)
   –   problem identification   [4]

4   Any **four** features from:
   –   data must be up to date
   –   data can only be read/used for the purpose for which it was collected
   –   data must be adequate, relevant and not excessive
   –   data must be accurate
   –   data must be destroyed when no longer needed/don't keep longer than necessary
   –   data user must register what data stored
   –   data must be used/collected fairly and lawfully
   –   data must be held securely
   –   data must be protected from accidental damage
   –   only authorised personnel can have access to the data
   –   fines are imposed for data mis-use
   –   data should not be passed on to a third party without permission
   –   a person can view data and have it changed/removed if incorrect
   –   safe harbour (countries with DPA at least as good)   [4]

5 (a) 1 mark each for 2 concerns
OR 1 mark for concern + 1 mark for expansion:

– customer goes online in a public place …..
…… and is overlooked as they enter id/password/PIN
– customer receives emails taking them to a false site …..
….. where they are asked to confirm details by entering them
– customer downloads virus, spyware, …..
….. which logs all key presses including id/password/PIN   [2]

(b) Any **two** points from:
– don't need card number for online transaction/card number already
– online user is anonymous/not visible
– online the customer does not need the card and signature/PIN   [2]

(c) Any **two** points from:
– secure sites using encryption
– use of passwords/PINs/biometrics/advice to change PIN regularly
– no communications with customer requiring personal details
– use of home card readers that generate codes known only to bank
and customer
– check with customer at each log on when they were *last* logged on to the
website
– contact customer if unusual transaction/random check
– customer asked to inform bank if intending to use card in
another country
– customer asked to inform bank if card lost/stolen
– ensure firewall is in place   [2]

6 (a) Any **four** points from e.g.:
– gather information from experts/questionnaires
– create the knowledge base
– type/put information into computer
– create rules/rules base
– create/design inference engine
– create/design input–output interface
– fully test the system
– expert system learns   [4]

(b) (i) Any **one** point from:
– 3D visual world
– uses computer simulation
– uses special interface devices (e.g. data gloves and goggles)   [1]

(ii) Any **one** point from:
– data gloves/goggles (if not given credit in part **(i)**)
– hardware/motors to provide movement
– special suits fitted with sensors   [1]

7 (a) Any **four** improvements from:
- use (text) boxes for
  - *names*
  - *addresses*
  - *sex*
  - *date of birth*
  - *subjects*
  - *grades*
- separate fields into separate entry items
  - *name* into *first name* and *last name*
  - *address* into *street*, *city* etc
- drop down list/combo box for
  - *date of birth*
  - *sex*
  - *subjects*
  - *grades*
- calendar object for
  - *date of birth*
- radio buttons for
  - *sex*
- hyperlinks for
  - *NEXT*
  - *BACK* [4]

(b) (i) **any one** point from:
- check on input for errors by double entry
- on screen checking
- check input is same as source

(ii) – name
– address [3]

8 (a) Any **two** points from:
- barcode is scanned/keyed in
- barcode is validated (by check digit)
- system looks up barcode in <u>computer files/database</u>
- retrieves (and returns) price [2]

(b)

if stock level <u><</u> minimum stock level	3
report printed out for manager	5
stock level reduced by 1	1
new stock value written back to file	2
more items are ordered automatically	4

1 mark for each correct answer up to max of 4.
4 marks for **all** 5 correct
3 marks for **any** 3 or 4 correct
2 marks for **any** 2 correct
1 mark for **any** 1 correct [4]

9   (a)   Any **two** correct input devices
          OR input device + correct type of screen

–   mouse/trackerball + CRT screen/TFT screen
–   touch screen + CRT screen/TFT screen
–   light pen + CRT screen   [2]

   (b)   **Dot matrix printer:**
          Accept a max of 2 advantages **and** a max of 2 disadvantages:

          Advantages:
          –   suitable for dirty/dusty/damp atmospheres
          –   cheap to maintain
          –   cheap to run
          –   can operate with continuous/multipart stationery

          Disadvantages:
          –   poor print quality
          –   very noisy
          –   very limited colours   [3]

          Inkjet printer:
          Accept a max of 2 advantages **and** a max of 2 disadvantages:

          Advantages:
          –   inexpensive to purchase
          –   high quality printouts
          –   can use colours
          –   supported by most operating systems
          –   quiet

          Disadvantages:
          –   run out of printing ink quickly/cartridges run out quickly
          –   price per page/inks are expensive
          –   not suitable for dirty/dusty/damp atmospheres   [3]

10 (a) Award marks as shown (each block = 1 mark):

	D	E
1	**Total cost ($)**	**Average cost per month ($)**
2	= B2 * C2	= D2 / 5
3	= B3 * C3	= D3 / 5
4	= B4 * C4	= D4 / 5
5	= B5 * C5	= D5 / 5
6	= B6 * C6	= D6 / 5
7	= B7 * C7	= D7 / 5
8	= AVERAGE (D2 : D7) Alternative answers: = SUM(D2:D7)/6 = (D2+D3+D4+D5+D6+D7)/6	= AVERAGE (E2 : E7) Alternative answers: = SUM(E2:E7)/6 = (E2+E3+E4+E5+E6+E7)/6 = D8/5

[4]

(b) (i) (A1 : A7)   and   (C1 : C7)
       (1 mark)   (1 mark)   [2]

(ii) Any **one** point from:
  – add an extra column and set all values to 2.08
  – draw a line at value 2.08 on the graph
  – add a trend/average line using spreadsheet software   [1]

(c) D6, E6, C8, D8, E8 (-1 mark for each error or omission)   [2]

11 (a)   E, H   [2]

(b)   (**Engine (litres)** > 1.8)   **OR**   (**CO$_2$ (g/km)** > 150)
       ←   (1 mark)   → ←   (1 mark)   →
                             Or
       (**CO$_2$ (g/km)** > 150)   **OR**   (**Engine (litres)** > 1.8)
       ←   (1 mark)   → ←   (1 mark)   →   [2]

(c)   G, C, D, B, F, A, E, H
       (1 mark for correct order (fuel used)
       1 mark for *ascending* order)   [2]

12 (a) Any **two** items from:
- webcams/<u>digital</u> video camera
- microphones
- broadband modem
- networking hardware e.g. cabling/router
- loud speakers/headphones [2]

(b) Any **two** items from:
- communications software
- CODEC/compression software
- Internet access software
- driver software (for the hardware in part **(a)**)
- echo cancellation software [2]

(c) Any **two** problems from:
- poor reception (poor sound, jerky screen images)/network failure
- if more than 2 conference locations, can be difficult controlling meeting
- time zones
- language difficulties
- power failure [2]

13 Expected output:

1
2
Error [3]

14 (a) Any **one** from:
- infra-red
- light
- radar
- ultrasonic / proximity [1]

(b) Any **four** points from:
- signal sent out from vehicle **A**
- sensors pick up reflected beam
- signal converted to digital by ADC
- computer uses data to calculate how close vehicle **B** is
- computer uses speed of vehicle **A** …..
- ….. to determine the *safe distance*
- if the *safe distance* > distance between the two vehicles …..
- ….. then the driver is warned
- sends <u>signal</u> to (actuators) apply brakes
- *reference to need for DAC*
- monitoring continues endlessly unless system deactivated
    * *no marks for computer applies the brakes*
    * *no marks for computer senses ….*
    * *no marks for sensor taking any actions* [4]

(c) Any **two** points from:
– when roads are busy, constantly braking
– system may not take road conditions into consideration
– over-reliance on system by the driver
– only works properly if vehicle has an automatic gearbox
– sensors don't work if obstructed/dirty/malfunction [2]

15

LEFT 90	**FORWARD 20**	**20 RIGHT 90/PENUP**
PENDOWN	**RIGHT 90**	**FORWARD 10**
FORWARD 10	**FORWARD 20**	**PENDOWN**
RIGHT 90	**RIGHT 90**	————————————
————————————	**FORWARD 20**	**FORWARD 10**
FORWARD 10	————————————	**RIGHT 90**
PENUP	**LEFT 90**	**FORWARD**
FORWARD 10	**FORWARD 20**	
PENDOWN	**PENUP / RIGHT 90**	
————————————	————————————	

(**NOTE**: the second sequence of instructions could be done with a REPEAT loop i.e. REPEAT 2
FORWARD 20
RIGHT 90
ENDREPEAT
FORWARD 20

It is also possible to write:
REPEAT 3
FORWARD 20
RIGHT 90
ENDREPEAT

followed by   LEFT 180 or RIGHT 180 instead of LEFT 90) [5]

16 (a)
```
total = 0                    (1 mark)      initialisation
for x = 1 to 50              (1 mark)      correct loop

    input number            (1 mark)      correct input and output

    if number > 100 then total = total + 1   (1 mark)

                                           count numbers>100

next x

output total
```

(1 mark for initialising total)
(1 mark for correct loop – accept **repeat** loop or a **while** loop)
(1 mark for correct input (within loop) **and** output (after the loop))
(1 mark for counting how many input numbers were > 100) [3]

(b) total = 0   (1 mark)   *initialise total*

    for x = 1 **to** 100   (1 mark)   *correct loop*

      input number   (1 mark) *correct input **and** output*

      total = total + number   (1 mark) *finding sum of numbers*

    next x

    average = total/100   (1 mark) *calculate average*

    output average

(1 mark for initialising total)
(1 mark for correct loop – accept **repeat** loop or a **while** loop)
(1 mark for correct input (inside the loop) **and** output (after the loop))
(1 mark for calculating total)
(1 mark for calculating the average outside the loop)   [3]