

UNIVERSITY OF CAMBRIDGE INTERNATIONAL EXAMINATIONS
GCE Ordinary Level

MARK SCHEME for the May/June 2010 question paper
for the guidance of teachers

7010 COMPUTER STUDIES

7010/11

Paper 11, maximum raw mark 100

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1 (a) video conferencing

Any **two** points from:

- meeting between 2 or more participants
- using computer networks/Internet
- to transmit audio/video data in real time
- pictures appear in a window on a monitor in real time
- *reference to hardware (webcams, speakers, microphones)*
- *reference to software (communications, compression)*

[2]

(b) 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]

(c) interrupt

Any **two** points from:

- a signal/request generated by a device/program
- which causes a break in the execution of a program/stops the program
- e.g. printer out of paper, <BREAK> key pressed, disk full

[2]

(d) 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
- output not time sensitive
- e.g. billing, payroll, cheque processing

[2]

(e) expert system

Any **two** points from:

- computer system that emulates/simulates human knowledge/contains knowledge of human expert
- uses an inference engine
- contains a knowledge base
- made up of rule base
- reference to expert system shell
- outputs probability of diagnosis given being correct/produces reasoned conclusions
- uses "Yes/No", multichoice interface
- e.g. medical diagnosis, chess, prospecting, financial modelling, diagnostics

[2]

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- 2** Any **two** tasks from:
- design data collection forms
 - design input forms/user interface
 - design systems flowcharts
 - design output forms/reports/screens
 - design/select validation rules
 - design/select verification methods
 - design test plan/strategy
 - specify/select hardware
 - specify/select software
 - design algorithms/program flowcharts/pseudocode
 - specify data structures
 - design files (structures)/tables / layout
 - design queries
- [2]
- 3 (a)** Any **two** features from:
- sound and/or video clips embedded in the presentation/multimedia
 - animation effects
 - diagrams/graphs/charts (in colour)/colour/text fonts etc
 - hyperlinks
- [2]
- (b)** Any **two** from:
- how it affects tasks such as filing/ordering etc.
 - retraining aspects
 - deskilling aspects
 - unemployment
- [2]
- 4** Any **three different** reasons and associated preventions
(prevention must match reason):
1 mark for reason, 1 mark for prevention
award each point only once

data corruption and data loss

viruses	–	use anti virus software, firewalls, no Internet access
power loss	–	back-ups, UPS
malicious damage	–	back-ups, password protection, controlled access
computer crash	–	back-ups, parallel computer (systems)
damage to CDs/disks	–	back-ups
operator error	–	training / good user interfaces

illegal access

hacking/unauthorised access	–	passwords, log-in ids, anti-hacking software (physical) lock room/computer
computer left logged on	–	log off when not in use, lock computer

[6]

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5 1 mark per description, 1 mark per advantage, 1 mark per disadvantage

Direct – old system stopped and next day new system started

Advantage:

- benefits are immediate/less time wasted
- reduced costs (only one system so fewer staff)
- less likely to malfunction since fully tested

Disadvantage:

- disastrous if new system fails/no fall back option

Parallel – old system and new system are run together for a time

Advantage:

- if new system goes down, have old system as back up
- can gradually train staff/have time to get used to new system

Disadvantage:

- more expensive/time consuming since 2 systems run together

Pilot – new system introduced into only part of the company

Advantage:

- if new system fails, only that part affected (rest is alright)
- can gradually train staff/have time to get used to new system

Disadvantage:

- time consuming (waiting to see how new system works)

Phased – part of the new system introduced and when it proves to work another part is introduced, etc./introduced part by part

Advantage:

- only a small part of the operations is affected if new system fails
- no need to pay two sets of wages (so cheaper)
- can ensure system works properly before expanding

Disadvantage:

- time consuming (each part needs to be tested before expanding)

[6]

6 (a) Any **three** from:

- keyboard (type in the responses)
- touch screen (select options from on screen menus)
- mouse/trackball/touchpad (click on options from a menu)
- microphone (speak options)
- data gloves/goggles
- camera

[3]

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(b) Any **three different** devices + associated application areas, e.g.:

- | | |
|--------------------------|--------------------------------|
| – bar code reader | – stock control |
| – OMR/mark sensing | – library systems |
| – touch screens | – multi-choice papers |
| – sensors | – questionnaires |
| – cameras | – information desks/kiosks |
| – MICR | – choosing goods on line |
| – microphones | – monitoring chemical plant |
| – magnetic stripe reader | – central heating systems |
| – data loggers | – traffic control |
| – OCR | – security |
| – Scanner | – reading bank cheques |
| | – reading travellers cheques |
| | – telephone systems |
| | – games |
| | – reading credit cards |
| | – reading security cards |
| | – weather monitoring |
| | – collecting experimental data |
| | – reading in documents |
| | – scanning in photos etc. |

[6]

7 Any of the following **three** stages:

- each time item is bought, bar code scanned (at POS)/use of bar codes
- bar code searched for on database/file
- number in stock reduced by 1
- when stock level $\leq$ re-order level/minimum level
- automatic re-ordering carried out
- when new stock arrives, stock levels updated

[3]

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

- 3D visual world
- created by a computer
- form of computer simulation
- data gloves used
- data goggles/headsets used
- hardware/motors to provide movement
- special suits fitted with sensors

[3]

(b) Any **two** from:

- safety (e.g. can “view” inside a nuclear reactor)
- feeling of “being there”
- can perform “actual tasks” beforehand (without risk)
- less expensive (IF QUALIFIED!!)

[2]

(c) Any **one** from e.g.:

- (medical) training
- walk throughs (e.g. virtual tours of a house)
- simulators (e.g. flight)
- 3D arcade games
- investigating problems in nuclear/chemical plants

[1]

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9 (a) Any **two** points from:

- e.g. choose by clicking on an arrow
- limited number of options available
- highlights option chosen
- use of pointing device to select an option

[2]

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

- used where limited number of options exist
- e.g. names of countries, days of month, date of birth

(ii) Any **one** from:

- cannot be used where “infinite” number of options exist
- e.g. addresses, people’s names

[2]

10 (a) Any **two** differences from:

compiler

- needs to be re-compiled every time a change is made
- code can be executed on its own
- translates whole code in one go
- translates source code into object code/machine code
- produces error list at end of compilation

interpreter

- translates instructions one at a time
- then executes the instructions immediately
- only finds errors as each instruction executed
- easier to edit/debug

[2]

(b) Any **one** high level advantage and any **one** low level advantage:

high-level language

- fewer instructions
- no need to understand registers/computer architecture
- instructions nearer to human language/English
- not machine specific/portable
- easier to debug programs
- easier to write programs

low-level language

- gain knowledge of how a computer works
- more control over how registers (etc.) are accessed
- can access registers (etc.) directly

[2]

(c) Any **one** from:

- program/algorithm broken down into simpler modules/smaller tasks
- each module is further sub-divided until basic elements produced
- allows several programmers to work at same time on the software
- can test each module independently

[1]

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11 (a) = AVERAGE(B5:F5) or
 = AVERAGE(B5,C5,D5,E5,F5) or
 = SUM(B5:F5)/5 or
 = (B5+C5+D5+E5+F5)/5 [1]

(b) = MAX(B5:F5)
 or
 = MAX(B5,C5,D5,E5,F5) [1]

(c) G4, (H4) [1]

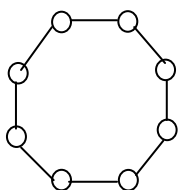
(d) – add column between F and G/insert column before G/insert column after F
 – change the formula(s) to allow 2010 data to be added [2]

12 1 mark for each error identified + 1 mark for each suggested correction

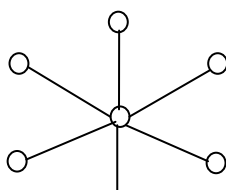
- error
 line 5: **numberpeople < 2** is incorrect
 correction:
numberpeople > 2
- error
 line 6: the formula/**charge = extracost** is incorrect
 correction:
charge = extracost + charge
- error
 line 7: discount calculation/**charge = charge * 0.1** is incorrect,
 correction:
charge = charge * 0.9 [6]

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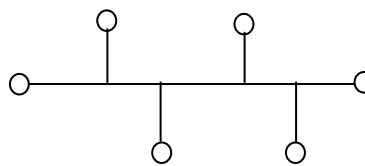
13 (a) Any **two** from:



Ring



star



bus

[2]

(b) **One** mark per advantage given:

Ring

- can create much larger networks
- faster/better operation under heavy workload
- requires less cabling than a STAR network, for example

Star

- easy to install and wire/expand
- no disruptions to network if terminal fails
- easy to detect faults in the system
- central monitoring and network management possible

Bus

- failure of single terminal doesn't affect entire network
- easy to connect a new terminal to the network
- requires less cabling, therefore less expensive than others

[2]

14 (a) Any **four** points from:

- flow sensor / temperature sensor
- send information / signal / data to microprocessor
- ADC converts data/signal (for microprocessor to understand/process)
- microprocessor compares flow rate/temperature with pre-set values
- sends signal to valve/heater to control flow rate/temp as required
- use of a DAC interface
- use of actuators
- system loops continuously until switched off

[4]

(b) Any **one** from:

- fail safe/switches off automatically
- temperature automatically sets to cold/switches off the heating
- flow cuts off and temperature sets to cold

(NOT a warning light/buzzer comes on)

[1]

(c) Any **one** from:

- more accurate control
- safer system
- more energy efficient

[1]

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15 (a) 12 [1]

(b) US1,US2 [1]

(c) (Country = "China") OR (No. of Floors > 80)
 ←-----1 mark -----→ ←----- 1 mark -----→

(No. of Floors > 80) OR (Country = "China")
 ←-----1 mark -----→ ←----- 1 mark -----→ [2]

(d) (i) range check, character check, length check

(ii) character check, type check, length check, format check [2]

(e) TA1, CH2, CH1, DU1, MA1, TA2, CH3, CH4, CH5, CH6, US1, US2
 (any order) (any order) [1]

16 (a) Any **two** from e.g.:

- electronic checkout
- shopping basket
- ability to track status of order on line
- secure buying using credit cards
- "when customer bought X, they also bought Y" facility
- search facilities for items
- recognise customers as soon as they log on
- drop down boxes to choose categories
- sales confirmation by automatic email
- save customer details/customised pages
- online help facility
- hyperlinks to other pages
- ability to bookmark/tag page(s) [2]

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

- process of changing/scrambling/encoding data into a meaningless form
- use of software/algorithms to turn data into a meaningless form [1]

(ii) Any **one** from:

- to avoid data being read/understood by hackers/unauthorised people
- to protect sensitive data from unauthorised people [1]

(c) Any **one** from:

- viruses being downloaded from the site
- bogus/fake sites
- "unwanted sites"/porn sites coming up when searching
- unsolicited mail
- "cookies" (etc.) being stored on hard drive (spying software)
- hacking [1]

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

- always “on”/no need to dial into ISP
- connection rate much higher (e.g. 11000 kbps cf 60 kbps)
- flat monthly rate (dial up charges based on number of hours used)
- can use phone line at same time/line not tied up
- allows other facilities such as VoIP
- download rate is much faster

[2]

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

Advantages

- can use anywhere within range
- no trailing wires

Disadvantages

- range can be limited
- possible interference from electronic devices
- security/tapping into WiFi networks
- (often) slower access speed than wired systems

[2]

(c) Any **one** from:

e.g.

- printers
- keyboard
- mouse
- cameras
- mobile phone
- GPS

[1]

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18 Marking points (maximum of 7 marks)

- initialising highest and lowest to reasonable values (must **not** be zero)
- first loop controlling one year (365 days)
- re-setting total for **each** day
- second loop controlling readings taken **per day**
- read temperature
- calculate total day temperature
- calculate total year temperature
- identifying highest temperature
- identifying lowest temperature
- finding average temperature for day
- finding average temperature for year
- output average day temperature inside loop
- output highest, lowest, average outside the loop

Sample algorithm in pseudocode

highest = -100: lowest = 100: total_year = 0 } 1 mark

for c = 1 **to** 365 } 1 mark

total_day = 0 } 1 mark

for d = 1 **to** 10 } 1 mark

read temp } 1 mark

total_day = total_day + temp } mark

total_year = total_year + temp } 1 mark

if temp > highest **then** highest = temp } 1 mark

if temp < lowest **then** lowest = temp } 1 mark

next d

average_day = total_day/10 } 1 mark

print average_day } 1 mark

next c

average_year = total_year/3650 } 1 mark

print highest, lowest, average_year } 1 mark

[7]