

**MARK SCHEME for the May/June 2012 question paper
for the guidance of teachers**

0420 COMPUTER STUDIES

0420/12

Paper 1, maximum raw mark 100

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- 1 Any **three** from:
- fact finding
 - feasibility study
 - analysis
 - design
 - testing
 - documentation/technical documentation/user guide
 - implementation/installation
 - evaluation
 - maintenance

[3]

2 **email**

advantages (one from:)

- easier to send attachments
- easier/faster to type
- can format text
- cheaper to send an email

disadvantage (one from:)

- need to buy computer equipment
- computer equipment not as portable as mobile phone
- need a broadband connection/modem/Internet access
- need account for emails
- can send a virus

mobile phones

advantages (one from:)

- completely portable method/can be used on the move
- more people have mobile phones
- use of predictive texting
- cheaper to buy a phone

disadvantage (one from:)

- can't send large documents/files/limited number of characters
- phone charges for sending messages are relatively high
- phone charges for sending messages overseas are high
- slow to key in messages/small keyboard
- often out of range of signal/poor signal
- smaller screens

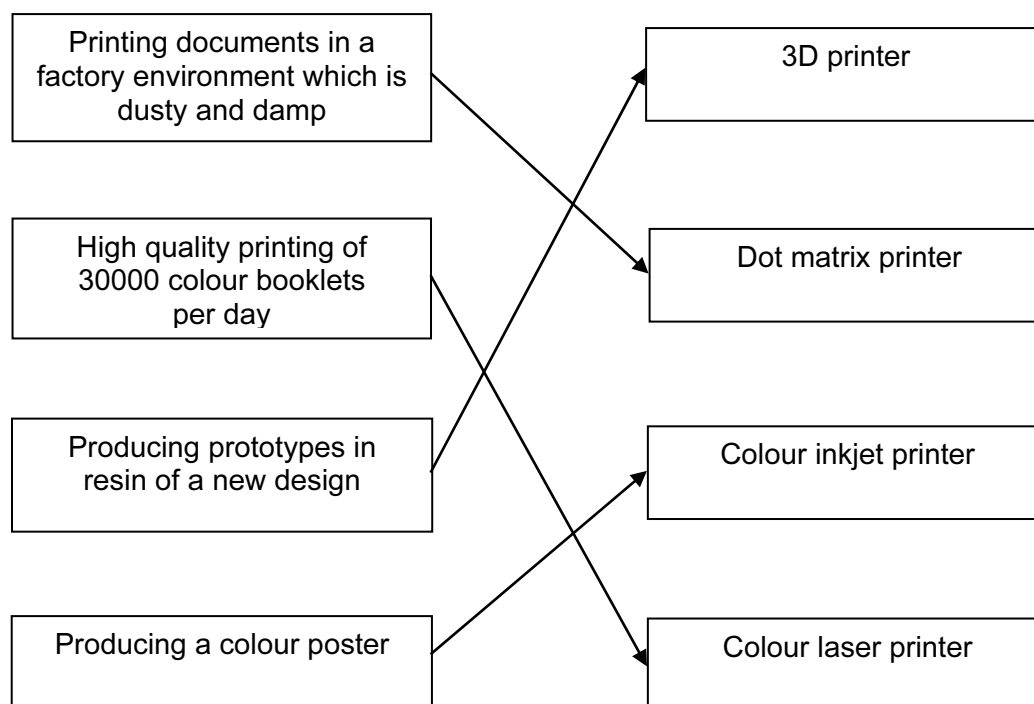
[4]

3 Any **five** from:

- viruses
- hacking
- cookies
- pharming
- phishing
- spyware
- tapping into unsecured wifi network/war driving
- shoulder surfing/over-the-shoulder observation of the Internet user's credentials/user name and password

[5]

4 (a)



[4]

(b) **3D printer**

- capable of producing solid objects
- cheaper than making a working model (by conventional methods)
- works with CAD

dot matrix printer

- can work in harsh environments
- (since in a factory,) noise levels are not important
- quality of printout not important
- robust printer

colour inkjet printer

- suited to low volume
- good/photographic quality printing

colour laser printer

- fast for volume printing

[4]

| | | | |
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- 5 (a) Any **three** from:
- wire frame
 - 2D / 3D modelling
 - library of parts which can be used in new drawings
 - validation / verification of designs against original specification
 - ability to link with computer-aided manufacture (CAM)
 - facility to calculate the mass of the actual object once built
 - facility to calculate the cost of producing the article
 - features such as rotation, colour, zoom, etc.
 - simulation of designs (without the need to build a prototype)
 - create engineering drawings from solid models
 - import and export to allow the exchange of data with other software packages
 - kinematics (i.e. check moving parts in assemblies don't interfere with each other)
 - automatic routing of cables and hoses
- [3]
- (b) Any **three** from:
- (very) large screens/monitors
 - plotters to draw scale and full size drawings
 - 3D printers
 - CAM machinery/CNC lathe
- [3]
- (c) Any **two** health risks and any **one** safety risk from:
- health risks**
- RSI from repeated/long continuous use of a keyboard/repeated clicking on a mouse
 - back/neck ache from bad posture/incorrect chair position
 - headaches caused by glare from monitors
 - eye strain caused by glare from monitors/poor lighting
 - dry eye caused by staring at screen without blinking
 - respiratory problems etc. caused by ozone/toner particulates emitted from a laser printer
- safety risks**
- electrocution e.g. bare wires, drinks near computers, etc.
 - trip hazards from trailing cables
 - heavy equipment falling due to failure of inadequate desks, work stations etc.
 - fires from short circuits/over-heating equipment
- [3]

6 (a)

| M | T | S | C | D |
|----|----|----|---|---|
| 32 | 1 | 0 | 1 | 1 |
| 16 | 32 | 32 | 2 | |
| 8 | 0 | 32 | 3 | 0 |
| 4 | 8 | 40 | 4 | 1 |
| 2 | 4 | 44 | 5 | 1 |
| 1 | 0 | 44 | 6 | 0 |
| | 1 | 45 | 7 | 1 |

(1 mark) (1 mark) (1 mark) (1 mark)

[4]

(b) converting binary number into equivalent base 10 number

[1]

(c) 60

[1]

7 (a) (i) Any **one** from:

- sound card and/or speakers
- possibly F1 key is faulty

[1]

(ii) Any **two** from:

- ask a further series of questions
- based on responses of the user
- reference to knowledge base/rules base/explanation system/inference engine

[2]

(iii) Any **one** from:

- % probability of identified fault found
- advice on how to correct fault
- change the speakers/sound card/keypad

[1]

(b) Any **three** from:

- knowledge base
- rules base
- inference engine
- expert system shell
- explanation system

[3]

(c) RAM

- to store data/programs/parts of operating system in use
- to store data that can be changed

ROM

- where operating system/bios is stored
- where data that starts up the system is stored

[2]

8 (a) -1 mark for each different error

| | D |
|---|---------------------------|
| 1 | bmi |
| 2 | = B2/(C2*C2) OR = B2/C2^2 |
| 3 | = B3/(C3*C3) OR = B3/C3^2 |
| 4 | = B4/(C4*C4) OR = B4/C4^2 |
| 5 | = B5/(C5*C5) OR = B5/C5^2 |
| 6 | = B6/(C6*C6) OR = B6/C6^2 |
| 7 | = B7/(C7*C7) OR = B7/C7^2 |

[2]

(b) (i) normal (correct spelling only)

[1]

- (ii) = SUM(D2:D7)/6 or
 = AVERAGE(D2:D7) or
 = (D2 + D3 + D4 + D5 + D6 + D7)/6

[1]

(iii) = IF(D8 < 18.5, "underweight", IF(D8 > 25, "overweight", "normal"))

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

[2]

(c) = 20 * C2 * C2

OR

= 20 * C2 ^ 2

[1]

| | | |
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- 9 (a) **barcode reader**
 e.g. (any reasonable application these are just examples)
- stock control
 - library loans
 - Point Of Sale system
 - tracking systems
 - itemised billing

- RFID**
 e.g. (any reasonable application these are just examples)
- identifying/tracking individual items e.g. livestock, vehicles

- magnetic stripe**
 e.g. (any reasonable application these are just examples)
- security cards (e.g. hotel room keys)
 - credit/debit/smart cards/ATMs/banking
 - loyalty cards

[3]

(b) 1 mark for naming validation check + 1 mark for example of its use (the two must match up)

- length check – check if an id number is exactly 8 characters long
- range check – check if a person's age is in the range 11 to 19
- limit check – check if salary paid greater than 0
- character/type – check if a telephone number contains digits only
- consistency check – return flight date after outbound flight date
- format check – check if a date is in the form dd/mm/yyyy
- presence check – filling out a form online where a given field MUST have data entered
- check digit – ISBN of a book

[4]

10 (a)

| A | B | C | X | |
|---|---|---|---|----------|
| 0 | 0 | 0 | 1 | (1 mark) |
| 0 | 0 | 1 | 1 | |
| 0 | 1 | 0 | 0 | (1 mark) |
| 0 | 1 | 1 | 1 | |
| 1 | 0 | 0 | 0 | (1 mark) |
| 1 | 0 | 1 | 0 | |
| 1 | 1 | 0 | 0 | (1 mark) |
| 1 | 1 | 1 | 1 | |

[4]

| | | |
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(b) 1 mark for correct logic gate + 1 mark for correct associated truth table.

Any two from:

- NOR, AND, OR, XOR (EOR)

| A | B | NOR | AND | OR | XOR |
|---|---|-----|-----|----|-----|
| 0 | 0 | 1 | 0 | 0 | 0 |
| 0 | 1 | 0 | 0 | 1 | 1 |
| 1 | 0 | 0 | 0 | 1 | 1 |
| 1 | 1 | 0 | 1 | 1 | 0 |

[4]

11 (a) (i) Any points from (maximum of 3 marks):

- signals/data supplied by sensors to the computer
- use of ADC
- computer compares data with pre-stored values
- if data beyond/greater than stored limit, intruder has been detected
- monitoring continues until re-set

(ii) Any points from (maximum of 2 marks):

- computer sends signal ...
- ... to set off siren/buzzer/light/alarm bell/sounds alarm
- use of a DAC
- automatically informs police/security company

Maximum mark: [4]

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

- signal sent to ...
- ... motors
- ... actuators

[2]

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

- motion
- light
- sound
- temperature

[1]

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

- store realistic values in memory/adjust sensitivity
- use 2 different sensors to monitor the same parameter (e.g. sound sensor and infra-red sensor to monitor intruder)
- fully/regularly test system once installed
- increase fault tolerance by use of redundant sensors and computers

[2]

| | | |
|--------|--------------------------------|----------|
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- 12 (a) (i) 3 minutes = 180 seconds
 each song = 180 * 128 = **23 040 kbits**
 number of bytes = 23 040/8 = **2880 kbyte**
 = **2.8(125) Mbyte**
- (ii) 4 Gbyte = 4 * 1024 = 4 096 Mbyte
 therefore, number of songs = 4 096/2.8125 = **1456 songs** [2]

- (b) Any **three** points from:
- uses hard disk/disk pack (2 to 5 disks)
 - each disk surface has a R/W head
 - use of read and write buffers
 - R/W operation is faster than general data transfer rate ...
 - ... therefore simultaneous read/write operations can occur
 - description of how a DVD-RAM works
 - concentric tracks allow R/W at the same time
 - fast R/W operation
- [3]

13 (a) code B [1]

- (b) Any **one** from:
- no need to understand workings of a computer
 - easier to understand for programmer/closer to English
 - much easier to debug
 - much easier to test
 - one to many when writing commands
 - not machine specific/portable
- [1]

- (c) Any **one** from:
- can address memory addresses directly
 - no need for compilers/interpreters
 - shorter code/code requires less storage/RAM
 - can (be written to) run faster
- [1]

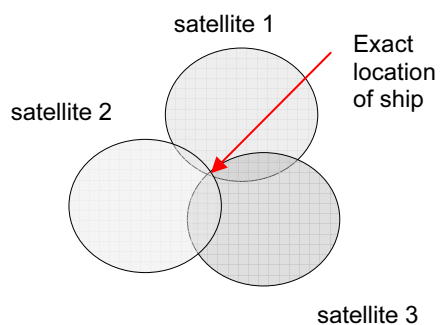
- (d) – compiler produces object code / interpreter doesn't produce object code
 – compiler translates whole program in one go / interpreter translates and executes line at a time
 – compiler produces list of all errors / interpreter produces error message each time an error encountered
 – compiler produces "stand alone code" / interpreter doesn't produce "stand alone code"
 – compilation process is slow but resultant code runs very quickly / interpreted code runs slowly
- [2]

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

- satellites transmit signals (to sat nav computer in the ship)
- computer receives/interprets these signals
- system depends on very accurate timing/use of atomic clocks
- each satellite transmits data including location and time
- computer in ship calculates its position based on at least 3 satellites
- at least 24 satellites in operation at a given time
- position of ship is known within 1 metre
- refer to triangulation:



[4]

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

- safer (can avoid known risks, identify safe harbour etc.)
- more accurate navigation
- can still navigate at night even under full cloud cover etc.
- the ship automatically transmits location 24/7
- ... if accident occurs, ship's exact location is known
- estimate time of arrival

[2]

(c) Any **one** from:

- output on LCD screen showing location in relation to known hazards etc.
- animation display (similar to a radar screen)
- verbal instructions

[1]

| | | |
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15 sample program:

```

total2 = 0: totalenquiries = 0
for day = 1 to 7
    input enquiries ..... (1 mark)
    total1 = 0 ..... (1 mark)
    totalenquiries = totalenquiries + enquiries ..... (1 mark)
    for i = 1 to enquiries ..... (1 mark)
        input cust_enquiry ..... (1 mark)
        if cust_enquiry < 100000 then total1 = total1 + 1 ..... (1 mark)
        if cust_enquiry > 500000 then total2 = total2 + 1 ..... (1 mark)
    next i
    print total1 ..... (1 mark)
next day
percent = (total2/totalenquiries) * 100 ..... (1 mark)
print percent ..... (1 mark)

```

marking points

- initialisation of weekly total (total2) and total enquiries outside first loop
- correct first loop (controlling the number of days i.e. 7)
- input number of enquiries + control of the central loop
- initialisation of daily total inside first loop (total1)
- correct input of customer enquiry (inside second loop)
- check how many enquiries < 100000 and increment total
- check how many enquiries > 500000 and increment total
- calculation of total enquiries and percentage enquiries
- BOTH outputs in the correct place

[6]