



## **General Certificate of Education**

# **Computing 6510**

**CPT5      Advanced Systems Development**

# **Report on the Examination**

*2007 examination - January series*

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## General

This unit covers practical topics, such as defining databases using DDL and systems development. Few candidates seem to have sufficient practical experience of these topics to be able to apply their understanding to answering questions with given scenarios successfully. Candidates also need to be reminded that they should write in full sentences and use technical terms correctly.

### **Question 1**

Candidates need to be aware that they should give answers in the context of the question. Just stating the obvious, for example, that a barcode scanner can be used to scan the barcode on students' ID cards is not sufficient to gain a mark. The question also stated that the uses for each hardware device should be different.

The barcode on the ID card might be scanned to record which student is entering a room. A fingerprint scanner might be attached to each computer and provide the means of logging onto a computer, since this method cannot be abused like username and password.

Many candidates suggested using a digital still camera to take pictures for the ID cards, but some candidates did not gain this mark because they only suggested taking pictures for students' ID. Some candidates proposed using the still camera to record at intervals the state of the room, but then found it difficult to suggest a different use for the digital video camera.

Programmable door locks were often not given any more functionality than locking the room out of hours which was insufficient to gain a mark. The better candidates combined it with using an ID card and only allowing authorised students into the room.

RFID tags are still unknown to a significant minority of candidates. This is disappointing since they have been in common use in shops and libraries for some time and candidates should be aware that they can be read from a distance and therefore students would not need to swipe them through a reader, speeding up the process of admitting students into rooms and logging who has entered a specific area. Candidates gained credit for the suggestion of tagging the equipment so that the RFID tag reader at the exit could detect if someone tried to remove college equipment.

### **Question 2**

Answers to this question were better than answers to similar questions in previous years. Candidates should have practical experience of selecting test data, at least for the AS Practical Exercise, but also for the preparation of their A2 project. A significant number of candidates do not appear to read the question carefully enough and are not precise enough in their answers. The better candidates clearly stated the three types of test data: normal, boundary and erroneous and then chose some suitable values, such as

- For normal data: a whole number between 0 and 35 inclusive to test basic rate calculations and between 36 and 48 hours inclusive for premium rate calculations for the hours above 35.
  - for boundary data: 0, 35, 36, 48, 49 to test that the calculations are correct either side of the boundary
  - for erroneous data: a negative value or a non-integer value, or a value above 48 to check that the function would not accept these values. In the case of a value above 48, candidates who stated that the function should only calculate the pay for 48 hours were also given credit.
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**Question 3**

- a) A very small minority of candidates could state the full name of the law: Copyright, Designs and Patents Act 1998. Credit was given to those who managed to state the term Copyright, but candidates should be reminded that this may not be sufficient in future examinations.
- b) Few candidates scored all three marks for the Entity-Relationship diagram. Very few were able to name the relationship. Some did not use the standard E-R diagram shapes.
- c) Although DDL statements were asked for in a previous paper, only a small minority of candidates were able to write the statements correctly to create the required tables. Credit was given for identifying the composite key in the SoftwareInstallation table. Candidates need to be reminded of the fact that identifiers should not contain spaces when naming attributes. The choice of identifiers should convey some meaning. For example the question required the date the software was purchased and the expiry date to be stored. Suitable attribute identifiers might be PurchaseDate and ExpiryDate. Date on its own is not sufficient, especially if the data type used is also Date.
- d) The SQL statement was mostly correct, although few candidates gained all 4 marks. A common error still is to introduce more attributes in the SELECT part than required or include semicolons and other punctuation where not required. Some candidates did not include the ORDER BY part which was required to get a list of each computer with its installed software.

**Question 4**

Most candidates answered this question very well. A few candidates, however, did not seem to understand that the terms in the question were emboldened to help them select the correct wording for the labels. Some do not appreciate the need for a verb to label a process. The type of diagram is a 'Data Flow Diagram', variations on this term did not gain credit. For part (c), some candidates did not appreciate that an impact printer was required to produce receipts in triplicate using carbon copy stationery.

**Question 5**

- a) Very few candidates appreciated that the issue with encryption of e-mails using symmetric keys is how to get the key from the sender to the recipient. Some wrongly thought that the key would have to be made public, or that all e-mails would have to use the same key.
- b) Most candidates stated correctly that Jack would need to encrypt the message with Jill's public key and then Jill could decrypt it with her private key. Some candidates did not state whose public/private key was required to be used, and so did not gain the marks available.
- c) There seems to be a lot of uncertainty about what a digital signature is or how it might be produced. It is not a signature in the conventional sense. Candidates who gained full marks could explain that the message (before encryption) was hashed into a message digest, which was then encrypted using the sender's private key.
- d) The lack of understanding of digital signatures was further highlighted by the responses to this part of the question. Verifying Jack's digital signature means, to ensure that the

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message really was sent by Jack, Jack will need to have sent a digital certificate with the message, containing his public key. The digital certificate needs to be decrypted using the Certificate Authority's public key, ensuring that the digital certificate is genuine. Now the signature sent with the message can be decrypted using Jack's public key. The received (and decrypted) message is hashed and the result is compared to the decrypted signature. If both are the same the message has not been tampered with and is genuine.

### **Question 6**

- a) The definition of a protocol is still unknown to a significant minority of candidates, even though this question has been asked many times.
- b) Only the better candidates could state the missing 2 layers of the TCP/IP protocol stack in the diagram. Among the many creditworthy examples of types of application in the application layer were FTP, telnet etc. However, examples such as word processors were not appropriate.
- c) A pleasing majority of candidates knew that a MAC address was a unique identifier assigned to a network card.
- d) Some candidates did not seem to understand that one part of an IP address is used as the network ID (all devices on the same subnet will have the same network ID) and the other part is used as the host ID (to uniquely identify each device on the same subnet). The bits of the IP address used as network ID corresponds to the bits set to 1 in the subnet mask. The better candidates knew that 0 and 255 are not available as host IDs to assign to networked devices and therefore there are 254 different host IDs. To get more host IDs, the subnet mask should be changed or the network split into different subnets (with different network IDs). A significant number of candidates wrongly suggested that more IP addresses should be registered with the Internet registrar. Private addresses are chosen to avoid massive use of public addresses.
- e) Most candidates gained one mark for stating that a router would be required. A few of the better candidates provided excellent answers such as: the IP address registered with the Internet Registrar is assigned to the Internet facing network card of the router and the local IP address 192.168.4.1 (default gateway) is assigned to the LAN-facing network card of the router. The local computer sends the message to the LAN-facing network card of the router and the router sends the message to the Internet using the registered IP address. The router sends the reply from the Internet to the local computer's private IP address.

### **Question 7**

This topic has not been asked before and many candidates had no idea of what an expert system is. Most candidates gave irrelevant answers in the hope of striking lucky. The better candidates could explain that an expert system is software that mimics human reasoning and consists of a knowledge base, an inference engine and a user interface. Very few candidates could explain why an expert system was more than just a large database. The knowledge base stores facts as well as rules, not just data. The inference engine will try different pathways to a solution and "learns". An expert system can also reason with uncertain data and state conclusions.

## **Mark Ranges and Award of Grades**

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