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INFORMATION TECHNOLOGY IN A GLOBAL SOCIETY
HIGHER LEVEL
PAPER 2

Friday 4 November 2011 (morning)

2 hours

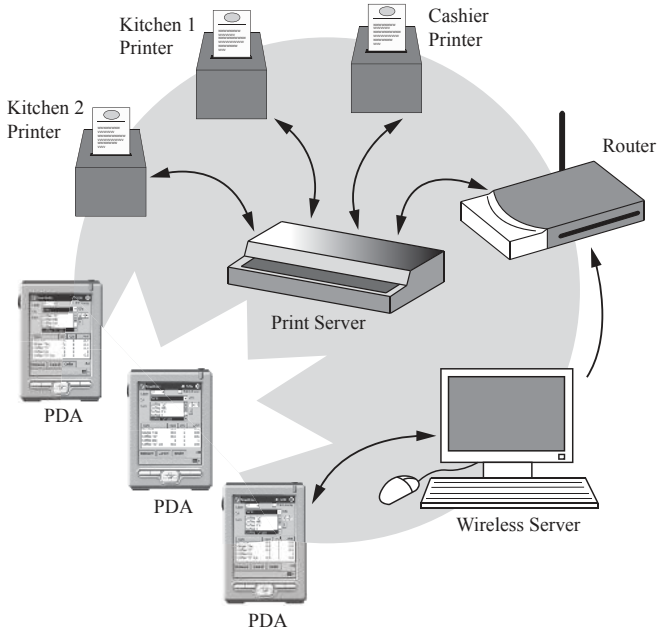
INSTRUCTIONS TO CANDIDATES

- Do not open this examination paper until instructed to do so.
- Answer three questions.

*Answer **three** questions.*

Area of impact: Business and employment / Arts, entertainment and leisure

1. The *Wireless Waitress* is a PDA-based system which allows waiters to take orders at the table in a restaurant. Orders are sent wirelessly to the server in the kitchen and a record of each order is printed. The bill is automatically calculated. As each meal item is ordered it is automatically deducted from the total quantity available. The diagram below shows an example of a wireless network in a restaurant.



[Source: http://accpol.com/wirelessrestaurantpos/systructure.htm, 12 October 2009]

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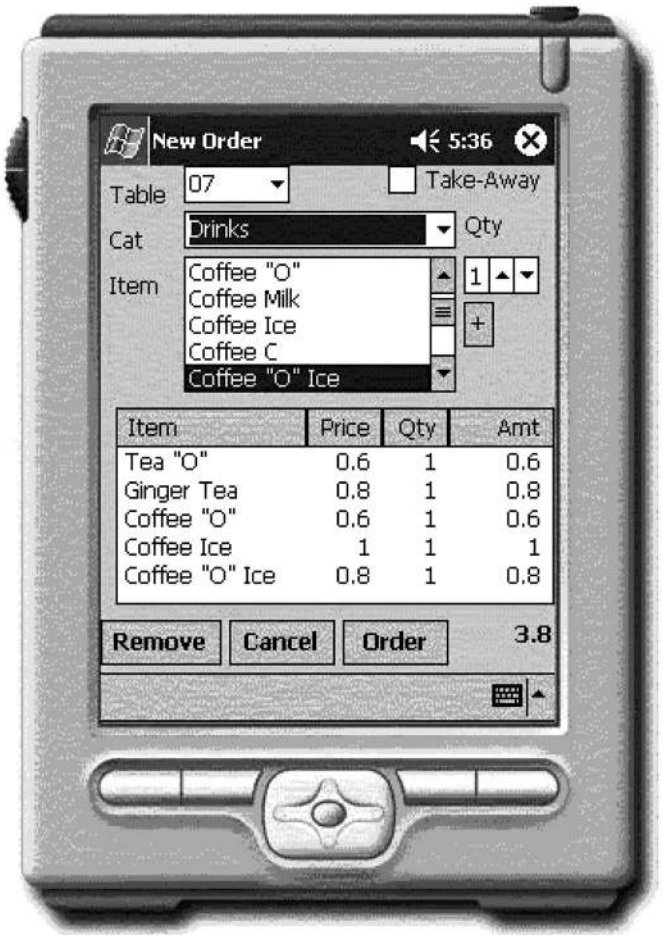
(Question 1 continued)

A typical PDA order entry screen is shown below.



[Source: http://accpol.com/wirelessrestaurantpos/screen.htm, 12 October 2009]

(a) Identify **two** characteristics of a PDA. *[2 marks]*

(b) Using information from both diagrams, identify the steps involved in processing a customer's order and payment. *[4 marks]*

(c) The PDA shown above allows waiters to select from options on the screen. Other PDAs allow users to input "handwritten" text directly on the screen.

Explain how handwriting recognition works on a PDA. *[4 marks]*

(d) The management of *Maggie's Meals* restaurant is considering introducing the *Wireless Waitress* system.

Evaluate the implications for both customers **and** restaurant staff. *[10 marks]*

Area of impact: Education

2. *Simplified Alerts* is an internet-based, mass SMS* alert notification system. It is designed for schools to send SMS advisory, weather, and emergency alerts to the cell (mobile) phones or e-mail addresses of parents and school staff. Administrators can customize a sign-up form, pre-set text messages, and send to user categories or entire lists. Parents need to sign up and opt in to receive messages. This ensures that messages will not be treated as spam.

[Source: adapted from http://simplifiedalerts.com/schoolalerts/index.html, 12 October 2009] Used with permission.

* SMS: a text message sent on a cell (mobile) phone

(a) Define the term *spam*. *[2 marks]*

(b) Many schools no longer print and post newsletters.

Describe **two** ways schools can distribute newsletters electronically to parents and the school community. *[4 marks]*

(c) Many parents receive the SMS alerts on their smart phones. The latest smart phones come with up to 32 GB of storage.

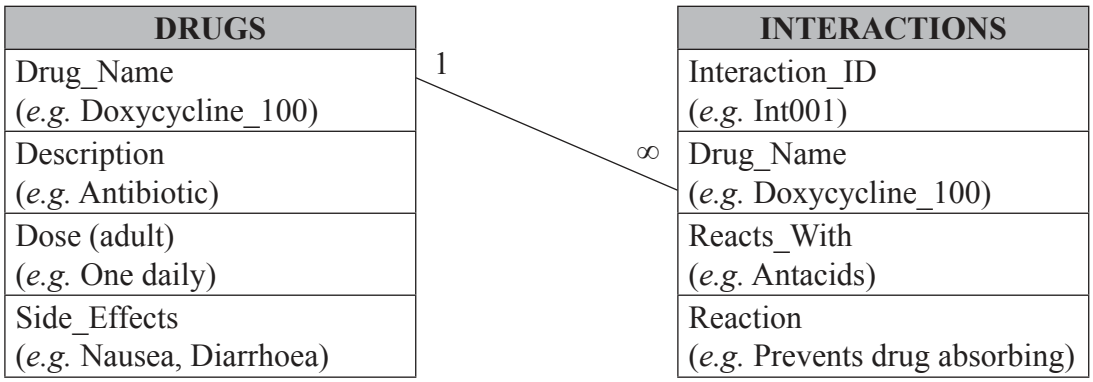
Explain the reasons why many people want this amount of storage on their smart phones. *[4 marks]*

(d) Discuss the advantages and disadvantages of introducing *Simplified Alerts* for schools **and** parents. *[10 marks]*

Area of impact: Health

3. In the past, during a medical visit, it was common for the doctor to consult a textbook before prescribing drugs for a patient. This book listed prescribed doses, any side effects, interactions with other drugs the patient is taking and warnings for patients with certain conditions such as pregnancy.

Today these textbooks are being replaced by electronic versions which use relational databases to store the information. A simplified version of a prescription database is shown in the diagram below.



Using this relational database a doctor can search DRUGS to check the correct dose for the patient and warn the patient about side effects. By linking to INTERACTIONS the doctor can check if the prescribed drug has any adverse interactions with other drugs the patient is taking.

By linking to another table, such as one containing information about drug warnings, the doctor is alerted to potential problems. For example, some drugs taken during pregnancy can harm the baby.

The information is stored in a relational database such as the one illustrated above. The brackets contain examples of typical data for the antibiotic Doxycycline_100.

[Source: http://mims.com.au, 13 October 2009] © MIMS Australia. Used with permission

(a) With reference to the relational database diagram above, describe the nature of the relationship between the table DRUGS and the table INTERACTIONS. *[2 marks]*

(b) It is important that the database is accurate.

Describe **two** design features that a database designer could use to prevent data input errors. *[4 marks]*

(c) This prescription database now comes in many electronic formats. Two possible formats are a CD-ROM version and an online version accessible through a web site.

Compare the effectiveness of these two formats in providing a doctor with the necessary information. *[4 marks]*

(d) Discuss how the use of the prescription database shown above can help a doctor to improve medical care. *[10 marks]*

Area of impact: Politics and government / Science and the environment

4. Hundreds of thousands of wheelie bins (garbage cans/rubbish bins) are being fitted with special RFID tags* to monitor the amount of non-recyclable garbage discarded by householders. The tag's microchip stores a serial number which identifies the household. The garbage trucks are fitted with RFID readers and sensors. They also contain special equipment which records the weight of the garbage. Garbage is collected twice a month.

Once the truck returns to the depot, all information collected is downloaded to a relational database on a central computer. Householders can then be billed each month for the amount of non-recyclable garbage that has been collected.

The aim is to encourage householders to recycle more and hence reduce their amount of non-recyclable garbage.

[Source: adapted from http://independent.co.uk/news/uk/this-britain/ 500000-wheelie-bins-have-a-spy-in-the-lid-413566.html, 13 October 2009]

[Source: http://en.wikipedia.org/wiki/File:ACT_recycling_truck.jpg]

* RFID tag: RFID (radio frequency identification) tags include a microchip and an antenna. Data on the tag is read by a reader

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(Question 4 continued)

(a) Define the term *sensor*. *[2 marks]*

(b) Identify the steps involved in calculating the monthly non-recyclable waste cost for a household. *[4 marks]*

(c) Local governments want to create an advertising campaign that targets neighbourhoods where householders have large quantities of non-recyclable garbage.

Explain how data mining can be used to identify these neighbourhoods without breaching householders' privacy. *[4 marks]*

(d) Many householders have expressed concerns about having their garbage monitored in this way.

To what extent are these concerns justified? *[10 marks]*