UNIVERSITY OF LONDON

GOLDSMITHS COLLEGE

B. Sc. Examination 2002

SEE PART "A" FOR FRONT PAGE

IS51006A (CIS106)   Introduction to Computing

Duration: 3 hours

Date and time:

Do not attempt more than FOUR questions on this paper.

Full marks will be awarded for complete answers to FOUR questions.

Electronic calculators may be used. The make and model should be specified on the script. The calculator must not be programmed prior to the examination. Calculators which display graphics, text or algebraic equations are not allowed.

Part B: Answer *TWO* questions from this section

Question 4   (a) Discuss some advantages and disadvantages of using centralised databases within an enterprise, compared to a situation where different departments and different applications use their own dedicated file systems.

[7]

(b) In the context of database theory, explain the terms *insert anomaly, delete anomaly, update anomaly*. Construct examples of how these anomalies could arise when adding, removing or modifying information in the relation depicted below. Decompose the relation into separate tables to minimise the exposure to anomalies.

PATIENTS

PAT#	PNAME	AGE	WARD	CONSULTANT
P1	Lopez	45	W1	Abrahams
P2	Smith	21	W1	Abrahams
P3	Smith	87	W2	Johnson
P4	Lee	93	W2	Johnson
P5	Patel	35	W3	Abrahams

(Assume that each consultant is attached to one or more wards but no ward has more than one consultant.)

[12]

(c)   (i) Explain the following terms in the context of UK data protection legislation: *data controller, data processor, subject access, sensitive personal data*.

(ii) Under the UK Data Protection Act 1998, which of the following have the right to demand to be told what personal information about them is held on computer records?

   i. private individuals

   ii. voluntary organisations

   iii. political parties

   iv. businesses

   v. all of the above

   vi. none of the above.

[6]

Question 5   (a) In the context of computer security, privacy and internet computing, explain **four** of the following terms: *macro virus, trojan horse, web bug, cookie, cavity virus.*

[8]

  (b) Discuss two ways viruses can be delivered via email messages. Without installing special software, what steps can users take to guard against these attacks?

[8]

  (c) What is the relevance of the UK Data Protection Act 1998 for issues of viruses and security of computer systems? If an enterprise uses computer systems to collect and store personal data, what technical and procedural steps could they take to ensure they are in compliance with the Act in this respect?

[9]

Question 6 (a) Write regular expressions for the languages described below using only the specified letters of the alphabet and numerals, and the operations of sequencing, *, | and parentheses.

(i) Strings of two or more occurrences of a.

(ii) Strings of an odd number of a's followed by an even number of b's.

(iii) Strings which begin with an uppercase letter from A to Z, followed by an arbitrary non-zero number of lower case letters from a to z, concluding with a single numeral from 0 to 9.

[9]

(b) The following context free grammar generates certain logical expressions:

(R1) Formula $\rightarrow$ (Formula $\wedge$ Formula)

(R2) Formula $\rightarrow$ (Formula $\vee$ Formula)

(R3) Formula $\rightarrow$ ¬Formula

(R4) Formula $\rightarrow p$

(R5) Formula $\rightarrow q$

(R6) Formula $\rightarrow r$

For each of the following expressions, indicate whether it belongs to the language defined by the above grammar.

(i) $\neg(p \ \wedge \ (q \ \vee \ r))$

(ii) $(\neg p \ \wedge \ q \ \vee \ r)$

(iii) $(\neg p \ \wedge \ (q \ \vee \ r))$

(iv) $(\neg(p) \ \wedge \ q)$

(v) $\neg\neg(p \ \wedge \ q)$

(vi) $\neg\neg p \ \wedge \ q$

[6]

(c) The following is a sample of a document in an invented language, Basic Markup Language. Write a formal grammar for this language, assuming that <HEAD> and <LIST> are optional but the other items are obligatory, and that a list can have an arbitrary (non-zero) number of members. (Treat Title_text etc. as terminal symbols. You **may** use BNF but this is **not** obligatory.)

```
<BML>
  <HEAD><TITLE> Title_text </TITLE></HEAD>
  <BODY>
     Body_text
     <LIST>
       <LI> Words </LI>
       <LI> Words </LI>
       <LI> Words </LI>
     </LIST>
  </BODY>
</BML>
```

[10]