

UNIVERSITY OF LONDON

GOLDSMITHS COLLEGE

Department of Computing

B. Sc. Examination 2014

IS52027A

Databases, Networks and the Web

Duration: 3 hours

Date and time:

This paper is in two parts, Part A and Part B. There are a total of three questions in each part. You should answer TWO questions from Part A and TWO questions from Part B. Your answers to Part A and Part B should be written in separate answer books.

Full marks will be awarded for complete answers to a total of four questions, two from Part A and two from Part B. Each question carries 25 marks. The marks for each part of a question are indicated at the end of the part in [.] brackets.

There are 100 marks available on this paper.

Electronic calculators must not be programmed prior to the examination. Calculators which display graphics, text or algebraic equations are not allowed.

**THIS PAPER MUST NOT BE REMOVED
FROM THE EXAMINATION ROOM**

PART A

Question 1

Question 2

Question 3

PART B

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Question 4

Question 4 concerns dynamic website concepts, php security, and accessibility.

(a)

Dynamic, web-based applications can be implemented using the LAMP solution stack. Name each of the four components of this model and describe the functionality that each one provides.

[12 marks]

(b)

Consider the following two snippets of PHP code below, in which a malicious user is employing a security loophole. The original code is shown BEFORE MODIFICATION. The altered code is shown AFTER MODIFICATION:

BEFORE MODIFICATION:

```
$sql = "INSERT INTO Students (name) VALUES ('{$_POST['student_name']}')";
```

AFTER MODIFICATION:

```
$sql = "INSERT INTO students (name) VALUES ('Robert'); DROP TABLE Students;--'"
```

What is this kind of attack called?

[2 marks]

How does this attack work and what effect will this modification have, if it is executed successfully?

[4 marks]

What technique could be used to prevent this kind of attack?

[2 marks]

(c)

What is the purpose of accessibility validation? Give two reasons why code validation is important.

[5 marks]

Question 5

This question concerns dynamic websites and PHP scripting.

(a)

One of the features of PHP is the ability to create “cookies”. What are cookies used for?

[3 marks]

Explain three (3) benefits that cookies provide.

[3 marks]

What is the main difference between cookies and sessions?

[7 marks]

(b)

Examine the PHP code fragment below.

Code:

```
if ($_SERVER['REQUEST_METHOD'] == 'XXXX') {

    $dbc = YYYY('localhost', 'username', 'password');
    mysql_select_db('myblog', $dbc);

    $problem = FALSE;
    if (!empty($_POST['title']) && !empty($_POST['entry'])) {
        $title = trim(strip_tags($_POST['title']));
        $entry = trim(strip_tags($_POST['entry']));
    } else {
        print '<p style="color: red;">Please submit both a title and an entry.</p>';
        $problem = TRUE;
    }

    if (!$problem) {

        // Define the query:
        $query = "INSERT INTO entries (entry_id, title, entry, date_entered) ZZZZ
(0, '$title', '$entry', NOW())";

        // Execute the query:
        if (@mysql_query($query, $dbc)) {
            print '<p>The blog entry has been added!</p>';
        } else {
            print '<p style="color: red;">Could not add the entry because:<br />'
. mysql_error($dbc) . '</p><p>The query being run was: ' . $query . '</p>';
        }

        } // No problem!

    mysql_close($dbc); // Close the connection.

}
```

In a sentence or two, explain what the php script above does. Where does the script get the \$_POST values from?

[2 marks]

Suggest suitable replacements for **XXXX** and **YYYY** and **ZZZZ**.

Explain where the server obtains the values for the `$_SERVER['REQUEST_METHOD']`.

Explain the purpose of `$problem=FALSE`;

[5 marks]

(c)

Explain what is meant by output buffering in PHP scripting.

[5 marks]

What common kinds of errors can be avoided by using this technique?

[2 marks]

Question 6

This question concerns networks and communications protocols.

(a)

Explain the concept of layering in networked computing. What purpose does the OSI model serve?

[3 marks]

Describe each of the 7 layers of the OSI model, providing its name and in a few words, its function. For full marks, you must ensure the layers are in the right sequence. You can describe them either from the bottom-up or from the top-down.

[9 Marks]

(b)

How many host computers can be attached to a network with an IP prefix of /24? Be sure to show your calculation.

[3 Marks]

Internet Protocol version 6 (IPv6) has been developed to replace IPv4. Give 5 benefits that IPv6 will offer over IPv4.

[5 Marks]

(c)

Explain in general terms how the TCP/IP protocols ensure data is transmitted reliably, with reference to the three-way handshake, and sequence number.

[5 marks]

END OF EXAMINATION