

UNIVERSITY OF LONDON

GOLDSMITHS COLLEGE

Department of Computing

B. Sc. Examination 2013

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

Question 4

a)

Consider the following example of PHP code:

```
if ($password == "my_password") {  
    $authorized = 1;  
}  
  
if ($authorized == 1) {  
    echo "Lots of important stuff."  
}
```

How might a malicious user be able to exploit this code to get unauthorised access to your system? How could you modify the code to stop this happening?

[10 marks]

b)

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

[5 marks]

c)

Consider the project that you have completed for the coursework portion for this course. Explain the schema that you employed for your database in detail. Describe one of the queries you used to return results based on the user requirements and tasks. Use specific references to the details of how you implemented the solution for your project.

[10 marks]

Question 5

a)

Briefly describe two different ways of storing persistent data for a web user over a series of transactions. What are the pros and cons of using one or the other for a particular application?

[8 marks]

b)

Explain what the script below does and suggest suitable replacements for XXXX and YYYY. Where does the server obtain the values for \$_SERVER[REQUEST_METHOD]? What is the purpose of \$problem=FALSE;?

```

<?php
if ($_SERVER['REQUEST_METHOD'] == 'POST') {
    $dbc = mysql_connect('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>Please submit both a title and an entry.</p>';
        $problem = TRUE;
    }
    if (!$problem) {
        $query = "XXXXX INTO entries (entry_id, title, entry, date_entered) VALUES (0,
'$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: ' . $query . '</p>';
        }
    }
    mysql_YYYY($dbc);
}
?>

```

[12 marks]

c)

Explain what is meant by output buffering in PHP scripting. What common kinds of errors can be avoided by using this technique?

[5 marks]

Question 6

This question concerns networks and communications protocols.

a)

- i. Explain the concept of layering in networked computing. What purpose does it serve? How are headers used to implement layering in TCP/IP?
- ii. Which TCP/IP layers do the following protocols belong to? Briefly state the functions defined for each protocol, for instance “*DHCP: Internet layer protocol for automatically assigning IP addresses and other parameters to host computers.*”
 - i. DNS
 - ii. HTTP
 - iii. SMTP
 - iv. ICMP

[8 Marks]

b)

- i. Explain what is meant by the “classful” system of IP addressing and routing in

- IPv4. Why has this been superseded by Classless Inter-Domain Routing (CIDR)?
- ii. How many host computers can be attached to a network with an IP prefix of /24?
 - iii. Explain how the following addresses are divided into network and host portions. Calculate how many hosts can be on each subnet:
 - i. 129.8.45.13/16
 - ii. 172.16.10.50/18
 - iii. 192.168.101.45/26

[12 Marks]

- c) In the TCP/IP model, which layer is primarily responsible for **reliable** (error-free) transmission? Explain in general terms how TCP/IP protocols ensure data is transmitted reliably, with reference to the **three-way handshake**, and **sequence number**.

[6 marks]