Part B. Answer TWO questions from this part.

Question 4.

This question concerns networks and communications protocols

a)

i. Explain the concept of **layering** in networked computing. 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. HTTP
ii. DNS
iii. ICMP

[7 marks]

b) 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**. **[6 marks]**

c)

i. Explain what is meant by the **classful** system of IP addressing and routing in IPv4. Why this has been superseded by Classless Inter-Domain Routing (CIDR), and what are the implications for the design and contents of **routing tables**?

ii. How many host computers can be attached to a network with an IP prefix of /23?

iii. Explain how the following addresses are divided into network and host portions:
129.8.45.13/24
124.42.5.45/26
220.3.6.23/23

[12 marks]

Question 5

This question concerns web programming and PHP scripting

a. Briefly explain the following:
   i. The differences between **GET** and **POST** methods in PHP scripts
   ii. The use of **cookies** and **session variables** in web applications.

[8 marks]

b. Appendix A shows a PHP script adapted from Larry Ullman's *PHP for the Web*. Explain what this script does and suggest suitable text for Messages 1, 2 and 3.

[9 marks]

c. The following is a (simplified) sequence of HTTP headers from a single transaction, captured using the **Live HTTP Headers** Firefox Add-on. Briefly explain the functions of each header and the meanings of these particular examples:
[8 marks]

```
GET /computing/ HTTP/1.1
Host: www.gold.ac.uk
User-Agent: Firefox/3.5.3
Accept: text/html,application/xhtml+xml,application/xml
Accept-Language: en-gb,en
Accept-Encoding: gzip,deflate
Accept-Charset: ISO-8859-1,utf-8
Connection: keep-alive
Referer: http://www.gold.ac.uk/

HTTP/1.1 200 OK
Date: Fri, 11 Feb 2012 15:28:31 GMT
Server: Apache/2.2.3 (Red Hat)
X-Powered-By: PHP/5.1.6
Cache-Control: private
Connection: close
Content-Type: text/html; charset=UTF-8
```

Question 6

This question concerns security, accessibility and regulatory issues

a) Why is it important for website operators to ensure that their content can be accessed by people with disabilities? **[4 marks]**

b)

i. Explain in general terms how a **screen reader** renders a webpage. How will this influence the design and coding of a webpage that is likely to be accessed by partially sighted users?

ii. Appendix B shows an example of a web page coded in HTML. How could this page be modified to make it more accessible to users of screen readers?

[9 marks]

c) Explain what is meant by **cross-site scripting** and **SQL injection attacks**. How can you guard against these threats in a PHP script?

[6 marks]

d) Suppose you are operating a social networking website which allows users to upload their own content, including text, music and images. What steps would you take to meet your legal responsibilities regarding **copyright** and **intellectual property**? **[6 marks]**

Appendix A: script8.php

```
<?php
define('TITLE', 'Script8');
require('templates/header.html');
print '<h1>Heading</h1>';
if ( isset($_POST['done']) ) {
	if ( (!empty($_POST['email'])) && (!empty($_POST['password'])) ) {

		if ( $_POST['email'] == 'me@example.com') &&
		($_POST['password'] == 'testpass') ) {
			print '<p>Message 1</p>';
		} else {
			print '<p>Message 2</p>';
		}
	} else {
		print '<p>Message 3</p>';
	}
} else {
	print '<form action="script8.php" method="post">
	<p>Email Address: <input type="text" name="email" size="20" /></p>
	<p>Password: <input type="password" name="password" size="20"/></p>
	<p><input type="submit" name="submit" value="Log In!" /></p>
	<input type="hidden" name="done" value="true" />
	</form>';
}
require('templates/footer.html');
?>
```

Appendix B

```
<html>
<body>
<table height="100%" width="100%">
<tbody><tr><td align="center" valign="center" width="25%">
<h3>Stanley Fish</h3>
<p><font size="4"><b>Lecturer<b></b></b></font>
<br><font size="4"><b>Computer Science</b></font> </p><p>
</p>
</td>
<td colspan="4" rowspan="2" align="center" valign="center">
<h2>Teaching</h2>
<p><font size="4"><a href="Projects.html">BSc Projects</a></font>
<br><font size="4"><a href="Algorithms.html">Algorithms</a></font>
</p>
<p>
<font size="5">Research</font></p>
<p><font size="4">Software Agents</font>
<br><font size="4">Computational Creativity</font>
</p>
<p><a href="Publications.html">
<font face="Arial" size="5"><b>Publications</b></font></a></p></td></tr>
<tr><td align="center" valign="center">
<img src="mugshot.jpg" border="0" height="183" width="182"></td></tr>
 </tbody></table>
 </body>
 </html>
```