PRIFYSGOL ABERYSTWYTH UNIVERSITY

SEMESTER ONE 2026

COMPUTER SCIENCE

CS25320 : PROGRAMMING FOR THE WEB

Time allowed: **1 HOUR AND 30 MINUTES**

Answer **TWO** from **THREE** questions.

All questions carry equal marks.

YOU MAY BRING THE FOLLOWING INTO THE EXAMINATION:
UP TO 3 SHEETS OF NOTES ON A4 PAPER (WHICH MAY BE DOUBLE-SIDED). THERE ARE NO ADDITIONAL RESTRICTIONS ON CONTENT OR FORMATTING OF THESE NOTES.
NO ELECTRONIC DEVICES.

CALCULATORS ARE NOT PERMITTED.

STUDENTS MAY SUBMIT ANSWERS TO THIS PAPER IN EITHER WELSH OR ENGLISH

Once seated, students may complete the front cover of the answer book(s) and the attendance slip ONLY.

DO NOT TURN THE EXAMINATION QUESTION PAPER OVER UNTIL INSTRUCTED TO DO SO.

Note: Where you are asked to provide examples, incorrect syntax in code will not be penalised provided it correctly demonstrates an understanding of the principles.

1. This question is about PHP and server-side scripting.

   a) PHP supports four (scalar) **variable types**. List these types, and explain how PHP handles **type casting** between them. Provide two examples where casting might lead to results you might not expect. [10 marks]

   b) Explain how you would use a `foreach` **loop** to iterate over an **associative array** in PHP. Provide an example where you loop through an array of user preferences (e.g., an array containing keys `theme` (possible values dark/light), `language` (en, cy, de etc), `font` (Times, Arial etc). [10 marks]

   c) A PHP script uses the following code to set a cookie:

```
setcookie("user_theme", "dark", time() + 60 * 60 * 24 * 30);
```

   Explain how this works and describe **two security risks** associated with cookies. [10 marks]

   d) What is a **bitwise operator** in PHP? Provide an example of how you might use it to check if a specific bit is set in an integer. [10 marks]

   e) A PHP script uses the following code to process user input:

```
$username = $_POST['username'];
echo "Welcome, $username!";
```

   From a security viewpoint, what is wrong with this code (there are two potential risks)? What two things could you do to fix it? [10 marks]

2. This question is about security issues in web development.

a) Why is it important to set file permissions to `700` (in `chmod` terms) for server side scripts on a Linux server? What risks could arise if permissions are set incorrectly? [10 marks]

b) What are **prepared statements**? Give an example in code. Why should these always be used when writing data supplied by a user to a database, from PHP? [10 marks]

c) What is **Cross-Site Request Forgery (CSRF)**? Explain how using a **CSRF token** can mitigate the risk. [10 marks]

d) A web application uses only **HTML5 form validation** (e.g., `<input type="email">`). Why is this not sufficient for security? Describe **two server-side validation techniques** you would implement. [10 marks]

e) Explain the concept of **Two-Factor Authentication (2FA)**. Provide an example of how it might be implemented in a web application and discuss why it is more secure than single-factor authentication. [10 marks]

3. Consider the following scenario: A local café, **Caffi Cwtch**, wants to expand its online ordering system. They need a system to manage customer orders, menu items, and inventory.

a) Caffi Cwtch needs a mechanism in its server side code to link incoming HTTP requests to an individual. Explain why this is an important consideration in server side programming, due to the stateless nature of HTTP. How is this normally dealt with in PHP? Give a code example which shows how this enables variables to be maintained from one HTTP access to the next. [15 marks]

b) The café initially considers using a **structured text file** (e.g., JSON) to store menu items. Explain why this might be suitable for their small menu. Describe **two disadvantages** of this approach compared to using a database. [10 marks]

c) It is decided to use a database. The café wants to ensure that the database is secure. Explain how you would use **roles and permissions** to restrict access. Provide an example of how you would grant a user **read-only access** to the **Menu_Items** table. [10 marks]

d) Unfortunately for Café Cwtch, the person they hired to check the security of their database did not know about sanitising inputs, and the database is accessed through a single account. Imagine that you are a black hat hacker. A rival café, Caffi Morladron, has offered to pay you in cryptocurrency to hack into Café Cwtch's database.

How might you go about this? Given examples in code, and discuss why the lack of sanitisation and having one single account helps you as a hacker gain access. [15 marks]

END OF PAPER