

UNIVERSITY OF BRISTOL

Summer Examination Period

FACULTY OF ENGINEERING

**2025 Examination for the Degree of
Bachelor and Master of Engineering and Bachelor and Master of
Science**

**COMS10012 and COMSM0085
Software Tools**

**TIME ALLOWED:
1 Hour**

This paper contains 32 questions, all of which are used for assessment; the maximum for this paper is 32.

Other Instructions:

This exam is open-book: you may bring in any handwritten or printed materials. You may use a faculty-approved calculator model.

TURN OVER ONLY WHEN TOLD TO START WRITING

1. Please make sure you read the instructions on the answer sheet.
2. Each question is worth 1 mark.
3. Only the answer sheet will be marked, the empty pages at the back of the exam are only used for your calculations.
4. When selecting answers, make clear, horizontal marks within the two sets of brackets, making sure that the contained letter is struck through.
5. Avoid marking the answer sheet outside specified areas.
6. Do not crease, dog-ear or otherwise damage the answer sheet.

Q1. Georgia is writing code to handle the responses from an unfamiliar HTTP server. She's testing out various requests to see what the response looks like, and then implementing her client-side code to handle the responses.

Here are the headers for one request:

```
HEAD /1000bytes.txt HTTP/1.1
Host: www.requestplusonebyte.co.uk
Connection: close
```

And here are the headers from the corresponding response:

```
HTTP/1.1 200 OK
Content-Type: text/plain
Content-Length: 1009
```

How many bytes of message body will Georgia have to handle in her code for the response to this HEAD request?

- A. 0
 - B. 1000
 - C. 1001
 - D. 1009
- Q2.** In a HTTP URI, which of the *host*, *scheme* and *path* components are case-insensitive?
- A. None of them, all components are case-sensitive.
 - B. Only the *scheme* is case-insensitive.
 - C. The *scheme* and *host* are case-insensitive.
 - D. All of the *scheme*, *host* and *path* are case-insensitive.
- Q3.** You encounter an unfamiliar HTTP status code 204. Without knowing more than this code, which of the below might you reasonably conclude?
- A. The request has completed successfully.
 - B. The server needs to redirect you to another location.
 - C. The server has encountered an internal error.
 - D. There is an error in the request sent by the client.
- Q4.** Which of the below is NOT a HTML5 element?
- A. select
 - B. thead
 - C. input
 - D. value

- Q5.** Why should you use `h1` for a page's top-level heading, instead of some other element?
- A. It sets the correct font size and weight for a top-level heading.
 - B. You don't need to, this is just done by convention.
 - C. It allows programs to understand that the contained text is intended as a top-level heading.
 - D. You need at least one `h1` element on the page for the page to be valid HTML5, otherwise the browser will enter 'quirks' mode and this will affect page rendering.
- Q6.** An *absolute* URL:
- A. Points to a location using a protocol and domain name.
 - B. Is a permanent link that will never change.
 - C. Has the same value whether it is positive or negative.
 - D. Points to the top-level directory on a web server.
- Q7.** Which of these CSS selectors will apply a style to a `div` element that is a descendant of a `span` with the ID 'jumble'?
- A. `span.jumble div`
 - B. `span#jumble > div`
 - C. `span.jumble > div`
 - D. `span#jumble div`
- Q8.** A rule with a selector of `form+button, .stray` would be applied to:
- A. A `stray` element inside a `form` with class 'button'.
 - B. Any `button` element inside a `form`, and any element with the ID 'stray'.
 - C. Any `button` element immediately following a `form`, and any element with the class 'stray'.
 - D. Any element with the class 'stray' which is inside a `form` element followed by a `button`
- Q9.** Which of these statements is true of a HTML box with a `display` of `inline`?
- A. The `width` and `height` properties are respected.
 - B. The box will not break onto a new line.
 - C. Top and bottom padding will cause other elements to be pushed away from the box.
 - D. Left and right margins will not apply to other `inline` elements.

Q10. Jack is browsing using a 700px-wide device when he encounters a webpage with the following CSS stylesheet:

```
body {
  color: blue;
}
print {
  color: black;
}
@media screen and (max-width: 600px){
  h1, p {
    color: red;
  }
  h2 {
    color: yellow;
  }
  form {
    color: blue;
  }
}
@media print {
  body {
    color: yellow;
  }
}
@media screen and (min-width: 800px){
  p, a, div, h1 {
    color: black;
  }
  h2, h3 {
    color: blue;
  }
}
```

When Jack prints out the webpage, what colour will the contents of the h1 element on the printed page be?

- A. blue
- B. red
- C. yellow
- D. black

Q11. In laying out a page, *margin collapse* can be best described as:

- A. When two vertically adjacent elements have touching margins, the larger of the two margins remains and the smaller one disappears.
- B. The lack of the expected margin effect that occurs when setting left and right margins on `inline` elements.
- C. A layout pattern in which element margin values can dynamically shrink in response to the viewport width and height.
- D. A failure mode that occurs when dynamically-adjusting margin values leads to margins unintentionally becoming negative.

Q12. When multiple items are added to a grid-based layout, they are automatically placed:

- A. In the topmost and leftmost free space available on the grid that is large enough to contain the item.
- B. In the earliest large enough free position on the grid according to the document's writing mode.
- C. In the first column of the first row on the grid.
- D. According to the item's preference rank property, but adjusted to account for whether the item can fit into the current column.

Q13. David has written a callback handler for a form submission event, in which he is attempting to make use of value typed into a text input field with the ID 'userinput'.

```
function plusE(){  
    const e = 0xE;  
    let uinputval = document.getElementById('userinput').value;  
    console.log("Now it's " + (e + uinputval));  
}
```

David types '5' into the input field and submits the form. Assuming the callback is executed, what will be logged in the console?

- A. "Now it's 0x13"
- B. "Now it's 19"
- C. "Now it's 20"
- D. "Now it's 145"

Q14. Which of the following is NOT a keyword in JavaScript?

- A. `this`
- B. `of`
- C. `not`
- D. `let`

Q15. Consider the following JavaScript code.

```
let curval = 20;
if (curval > 20){
    console.log("a")
}
let curval = curval+1;
if (curval > 20){
    console.log("b")
}
```

When this code is executed, which items would appear in the console?

- A. Both 'a' and 'b'.
 - B. Only 'a'.
 - C. Only 'b'.
 - D. Neither 'a' nor 'b'.
- Q16.** Gordon uses `fetch` to retrieve a web page in an asynchronous request, but he has made a typographical mistake in the *path* component of the URL. After he gets a 404 response, the state of the fetch Promise is:

- A. 'pending'
- B. 'fulfilled'
- C. 'rejected'
- D. undefined

Q17. A callback is attached to multiple JavaScript Promises like so:

```
Promise.all([promise1,promise2,promise3]).then(commonHandler)
```

`commonHandler` will be invoked:

- A. Up to three times, when any of the three promises are fulfilled.
- B. At most once, when every promise has been fulfilled.
- C. Exactly three times, every time one of the promises is resolved, whether they are fulfilled or rejected.
- D. Exactly once, after every promise has been resolved, whether they are fulfilled or rejected.

- Q18.** Bob needs to protect his web application's database from overlength passwords. It's most important for him to use:
- A. A polite notice to users about the password length restriction.
 - B. The `maxlength` property in HTML form validation.
 - C. JavaScript form validation, using an event listener to check the length of the input field's value upon the form submission event.
 - D. Server-side input validation.
- Q19.** When using `wget` with the `-nc` option, what will happen when attempting to download a file twice into the same directory?
- A. The first version of the file will be overwritten with the second version.
 - B. The first version of the file will be preserved and the second version will be given an extension `'1'`.
 - C. The first version of the file will be preserved and `wget` will refuse to download the second version of the file.
 - D. The behaviour will depend on the local and remote timestamps for the two versions. If the second version is newer than the first version, then the first version will be overwritten.
- Q20.** Guidelines to follow when web-scraping DO NOT include:
- A. Check for an alternative API endpoint first.
 - B. Respect the `robots.txt` file.
 - C. Be aware of limitations that apply to republishing even public web content.
 - D. Remember that while you can access web pages freely, downloading copies is copyright infringement.

Q21. Consider the HTML document below:

```
<!DOCTYPE html>
<html>
  <head>
    <meta charset='utf-8' />
    <link rel='stylesheet' href='style.css'/>
    <title>A Title</title>
  </head>
  <body>
    <header>
      <h1>A Title</h1>
    </header>
    <main>
      <p class='info'>
        This page links to some other pages.
      </p>
      <div class='container'>
        <div id="l1">
          <a href='./page1.html'>Page 1</a>
        </div>
        <div id="l2">
          <a href='./page2.html'>Page 2</a>
        </div>
        <div id="l3">
          <a href='./page3.html'>Page 3</a>
        </div>
        <div id="l4">
          <a href='./page4.html'>Page 4</a>
        </div>
        <div id="l5">
          <a href='./page5.html'>Page 5</a>
        </div>
      </div>
    </main>
    <footer>
      -- by A. Page Author.
    </footer>
  </body>
</html>
```

Assume a BeautifulSoup object named 'soup' has been created to represent this document. Which of the following lines of Python code would resolve to the string "Page 1"?

- A. `soup.find_all('a')[0]`
- B. `soup.find('l1').a.text`
- C. `soup.main.div.div.a.text`
- D. `soup.find('footer').parent.find('div').find_all('a')[1-1].contents`

Q22. The protocol HTTP operates at the 7th, *Application layer* of the OSI model. At which layer does the TCP protocol operate?

- A. 6, Presentation layer
- B. 5, Session layer
- C. 4, Transport layer
- D. 2, Data Link layer

Q23. Which statement best describes Public Key Cryptography?

- A. One key is created which is encrypted with a password.
- B. Two keys are created, and both are kept secret.
- C. Two keys are created, one that's public, one that is kept secret.
- D. One key is created that is publicly shared.

Q24. Consider the following certificate chain. Who issued it and when does the certificate expire?

Certificate chain

```
0 s:CN=kingdomofloathing.com
  i:C=US, O=Amazon, CN=Amazon RSA 2048 M02
  a:PKEY: rsaEncryption, 2048 (bit); sigalg: RSA-SHA256
  v:NotBefore: Oct 14 00:00:00 2024 GMT; NotAfter: Nov 12 23:59:59 2025 GMT
1 s:C=US, O=Amazon, CN=Amazon RSA 2048 M02
  i:C=US, O=Amazon, CN=Amazon Root CA 1
  a:PKEY: rsaEncryption, 2048 (bit); sigalg: RSA-SHA256
  v:NotBefore: Aug 23 22:25:30 2022 GMT; NotAfter: Aug 23 22:25:30 2030 GMT
2 s:C=US, O=Amazon, CN=Amazon Root CA 1
  i:C=US, ST=Arizona, L=Scottsdale, O=Starfield Technologies, Inc., CN=Starfield
    Services Root Certificate Authority - G2
  a:PKEY: rsaEncryption, 2048 (bit); sigalg: RSA-SHA256
  v:NotBefore: May 25 12:00:00 2015 GMT; NotAfter: Dec 31 01:00:00 2037 GMT
```

- A. kingdomofloathing.com, November 13 0:00:00 2025 GMT
- B. Amazon, August 23 22:25:31 2030 GMT
- C. Amazon, November 13: 00:00:00 2025 GMT
- D. kingdomofloathing.com, October 14: 00:00:00 2024 GMT

Q25. Why might you want to sign and encrypt an email?

- A. To ensure that it will not be flagged as spam.
- B. To ensure that the message is delivered to the correct recipient.
- C. To ensure that the message cannot be read by others, and to ensure that a strong encryption algorithm was used.
- D. To ensure that the message cannot be read by others, and so that the recipient can verify that you sent it.

Q26. What does RFC stand for in relation to internet standards?

- A. Request For Comments
- B. Request For Changes
- C. Recent Future Code
- D. Read For Code

Q27. What is a Berkeley Socket?

- A. A degree program at a prestigious university.
- B. A mechanism for resolving a domain name into an IP address.
- C. A file descriptor that can be read and written to.
- D. The endpoint of a connection over a network.

Q28. What port does finger run on?

- A. 80
- B. 79
- C. 70
- D. 22

Q29. What is fuzz testing?

- A. A series of unit tests that verify the code performs as expected.
- B. A mechanism for finding bugs by testing with random inputs until a crash is detected.
- C. A technique for testing surface rendering in computer graphics.
- D. A formal methods approach for proving code is correct.

Q30. What is the advantage of property-based test frameworks like *QuickCheck* over traditional unit testing?

- A. They can be written without knowing how to write code.
- B. They are faster and more efficient at finding bugs.
- C. They can generate a large number of test cases without having to specify each individually.
- D. They prove definitively that the code is correct for all inputs..

Q31. Brian wants to test their sorting function works. Which of the following properties might make good candidates to test with QuickCheck?

- 1. Sorting a sorted list gives the same list back.
 - 2. A sorted list has the same number of elements as an unsorted list.
 - 3. A sorted list is only equal to a reversed sorted list if it contains one or less unique elements.
 - 4. Sorting an empty list gives you an empty list
- A. 4 only.
 - B. All of them.
 - C. None of them.
 - D. 1, 2, and 3.

Q32. Who can't encrypt their email?

- A. Alice
- B. Johnny
- C. Bob
- D. François

(cont.)

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