This paper contains: 16 pages (including the title page)
Time allowed: 2 hours 0 minutes

**Section A:** (X)HTML, CSS, JavaScript, DOM, Events  30 marks
**Section B:** Node  30 marks
**TOTAL MARKS:**  60 marks

Candidates must attempt ALL questions.
The questions should be answered in the space provided in this examination paper.

---

**PLEASE NOTE**

Examination candidates may only bring authorised materials into the examination room. If a supervisor finds, during the examination, that you have unauthorised material, in whatever form, in the vicinity of your desk or on your person, whether in the examination room or the toilets or en route to/from the toilets, the matter will be reported to the head of school and disciplinary action will normally be taken against you. This action may result in your being deprived of any credit for this examination or even, in some cases, for the whole unit. This will apply regardless of whether the material has been used at the time it is found.

Therefore, any candidate who has brought any unauthorised material whatsoever into the examination room should declare it to the supervisor immediately. Candidates who are uncertain whether any material is authorised should ask the supervisor for clarification.
Section A: (X)HTML, CSS, JavaScript, DOM and Events

1. (15 marks)

(a) Explain how the vendor prefix is used to prevent diverging standards in CSS3.

(3 marks)

(b) What is the purpose of a CSS selector? What are the main differences between a class selector and an id selector, both syntactically and semantically?

(3 marks)
(c) Give javascript code to create a new person object. The Person should have a first_name, a surname, and a birthday. There should also be a function age that returns the person age in years today. (4 marks)

(d) What is the Document Object Model? Use examples to demonstrate three different ways of accessing an element using the JavaScript binding of DOM. (5 marks)
2. (15 marks)

(a) Write a JavaScript function that will dynamically create a `<div>` element with specified text and place it at the mouse clicked position.

**Argument:**
- `evt` - the event object
- `text` - the displayed content in div

For example, to place a letter ‘o’ at the mouse position after a click in the browser content area, the function can be called through

```
<body onclick="create(event, 'o')">
...
</body>
```
(b) Write a JavaScript function that displays the 216 web safe colours with their hex values in a 36 × 6 table. In an RGB colour model, assigning each of the Red, Green, Blue components with a value from \([00, 33, 66, 99, CC, FF]\) will create a web safe colour, for example, \(#3366FF\). Use the DOM methods `createElement()` and `appendChild()` to write the function. Working code using other DOM methods may receive partial marks.

```html
<html>
<head>
<title>Web Safe Colours</title>
<script src="palette.js"></script>
</head>
<body onload="palette()">
</body>
</html>
```

The figure on the right displays the last 12 rows of the generated table of web safe colours. Note that the grey scale is a result of printing, viewing on the screen shows the corresponding colour for each hex value. **Fill in the function template below with your code.**

```javascript
function palette(){
    var components = ['00','33','66','99','CC','FF'];
}
```
Section B: MEAN Stack

3. (10 marks)

(a) Describe, with a diagram the main components of an MVC project.
(b) Suppose that `unitList` is a list of javascript objects, each with a `unitName` and a `unitURL`.

This unit list should be used by a jade file `unit.jade` to render an unordered list of unit names, each with a hyper-reference to the appropriate url. Given a response `res` the command used is:

```
res.render('unit','uL':unitList);
```

Write `unit.jade` below:

```jade

```
4. (10 marks)

(a) Given the following client brief, in the space provided below, produce Mongoose schemas for the necessary models.

“The system is a basic project tracking system. The user enters the names of the companies they are doing work for. Each company can have unlimited projects. Each project belongs to one of six pre-defined categories. The categories are ‘Design’, ‘Development’, ‘Information Architecture’, ‘Copywriting’, ‘SEO’ and ‘PPC’.

The user must enter a name for each company and project. They can optionally enter a phone number and contact name.

We would also like the ability to add extra categories down the track - each category must have a name as well.”
(b) Given the schema produced in the previous question, give a set of commands to create a collection in a mongo database matching the schemas, with at least two entries in each.

(4 marks)
5. (10 marks)

(a) What is a closure in javascript. Write a closure, age that takes a birthday (Date) as an argument and returns a JavaScript function majority that returns the age of someone with that Birthday, in years.

You may use the constructor Date() that creates a new Date with the current time and day, and the methods getFullYear (returns the calendar year), getMonth (returns 00-11) and getDate (returns the day of the month).

(5 marks)

(b) Describe the main steps for setting up user authentication in an express project using passport.

(5 marks)
EXTRA BLANK PAGE