UNIVERSITY OF LONDON

CM2040

BSc EXAMINATION

COMPUTER SCIENCE

Databases, Networks and the Web

Release date: Thursday 16 September 2021 at 12:00 midday British Summer Time

Submission date: Friday 17 September 2021 by 12:00 midday British Summer Time

Time allowed: 24 hours to submit

INSTRUCTIONS TO CANDIDATES:

Section A of this assessment paper consists of a set of **10** Multiple Choice Questions (MCQs) which you will take separately from this paper. You should attempt to answer **ALL** the questions in Section A. The maximum mark for Section A is **40**.

Section A will be completed online on the VLE. You may choose to access the MCQs at any time following the release of the paper, but once you have accessed the MCQs you must submit your answers before the deadline or within **4 hours** of starting, whichever occurs first.

Section B of this assessment paper is an online assessment to be completed within the same 24-hour window as Section A. We anticipate that approximately **1 hour** is sufficient for you to answer Section B. Candidates must answer **TWO** out of the THREE questions in Section B. The maximum mark for Section B is **60**.

Calculators are not permitted in this examination. Credit will only be given if all workings are shown.

You should complete **Section B** of this paper and submit your answers as **one document**, if possible, in Microsoft Word or PDF to the appropriate area on the VLE. You are permitted to upload 30 documents. However, we advise you to upload as few documents as possible. Each file uploaded must be accompanied by a coversheet containing your **candidate number** written clearly at the top of the page before you upload your work. Do not write your name anywhere in your answers.

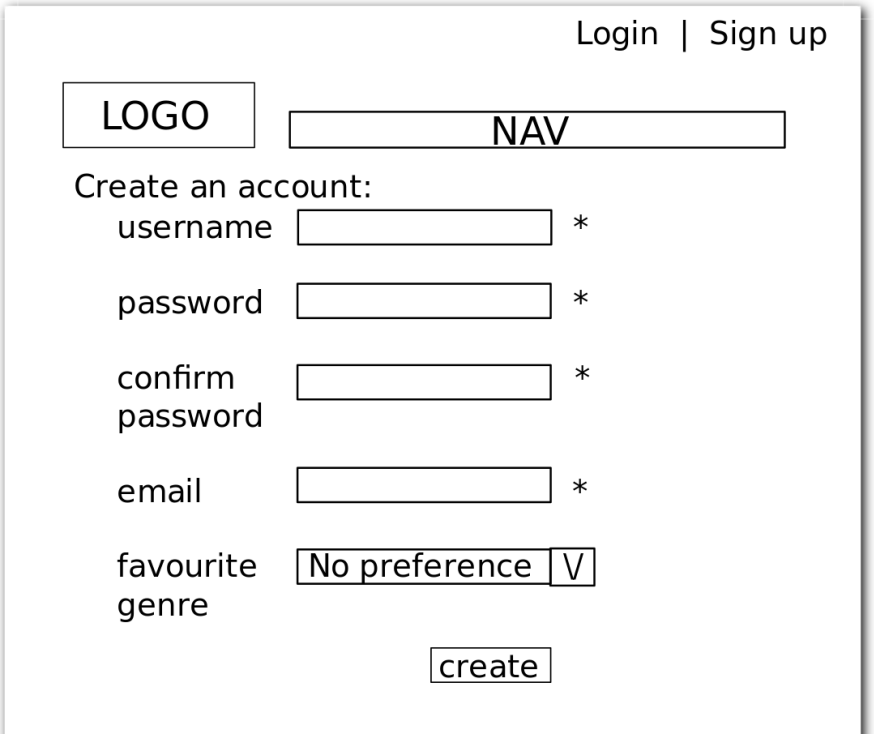
SECTION B

Candidates should answer any **TWO** questions in Section B.

Question 2

You are a freelance backend developer responsible for implementing a relational database for a new website called movie-reviews.com using MySQL database management system. You have been tasked with designing and developing a web application that will allow an end-user to perform the following tasks:

- Create an account/user profile as shown below:



- Search a database of movies by title, release year, genre, director, and average user rating
- Rate a movie on a 5-point scale
- Post a written review of a movie

(a) Draw an Entity Relationship Diagram (ERD) for the movie-reviews database. Your diagram should include entities and relationships between entities and suitable association types. [9]

(b) List primary and foreign keys in each table of the database you designed in part (a). [7]

(c) Write the corresponding SQL code for creating TWO of the tables you identified in your answer to part (a). [14]

Question 3

Consider the library database below, where each line shows a table with its properties, *TableName (column1, column2, ...),* and the primary keys and foreign keys are underlined. As an example, 'ISBN' in the 'borrowed' table is a foreign key referring to the primary key 'ISBN' in the 'book' table.

member (member_id, name)
book (ISBN, title, authors, publisher)

borrowed (member_id, ISBN, date)

(a) Present with an example the difference between SQL LEFT and RIGHT JOIN statement for the above database and then explain what they do. [8]

(b) Write a SQL statement that finds the number of the books, a member named 'Ali Smith' has borrowed. [7]

(c) The library is going to give a prize to members who have borrowed more than 20 books. Write a SQL JOIN statement that lists the name and ID of the members who have borrowed more than 20 books from the library. [7]

(d) Write a SQL statement to list ISBNs and authors of books borrowed more than 10 times and published by the publisher named 'UoL Press'. [8]

Question 4

You are a freelance backend developer responsible for implementing a relational database for a 'to do' list web application using Express and Node.js and the MySQL database management system. You have been tasked with designing and developing a web application that will allow an end-user to perform the following tasks:

- Create an account/user profile.
- Login using their credentials.
- Add a new 'to do' item to their list.
- List all items in their 'to do' list sorted by dates.

(a) Write a piece of middleware code, with a route named 'create_account' as follows:

- to store form data collected by a template file named account.ejs.
- account.ejs is already rendered in another route of the web application.
- Form data include *username* and *password*.
- Your code should access the database to store the account data.
- Your code should handle the error condition where the database query fails.
- Your code should display a message when an account is successfully created.

Please note, you are only required to write the middleware code and not the template file in this section of the question. Make sure you add comments for each section of the code. [10]

(b) Write an EJS template file for creating a user account named account.ejs. Please note the 'title' of the page is passed as a parameter to this EJS file. [7]

(c) Write a piece of code for another route called 'login' to let a user log in based on username and password already saved in the database as follows:

- To collect form data by a template file named login.ejs similar to account.ejs you have already written in part (b).
- To compare collected form data with data already saved in the database.
- The user is able to log in if and only if both username and password match with data saved in the database.
- Your code should handle the error condition where the database query fails.
- Your code should display appropriate error messages when the username is not found in the database or the password does not match.
- Please note each username saved in the database is unique. [13]

END OF PAPER