MODULE NAME:	MODULE CODE:
INFORMATION SYSTEMS 1B	INSY6112/w
DATABASES	DBAS6211/p

ASSESSMENT TYPE: ASSIGNMENT 1 (PAPER ONLY)

TOTAL MARK ALLOCATION: 100 MARKS

TOTAL HOURS: 10 HOURS

By submitting this assignment, you acknowledge that you have read and understood all the rules as per the terms in the registration contract, in particular the assignment and assessment rules in The IIE Assessment Strategy and Policy (IIE009), the intellectual integrity and plagiarism rules in the Intellectual Integrity and Property Rights Policy (IIE023), as well as any rules and regulations published in the student portal.

INSTRUCTIONS:

1. ***No material may be copied from original sources, even if referenced correctly, unless it is a direct quote indicated with quotation marks. No more than 10% of the assignment may consist of direct quotes.***
2. ***Your assignment must be submitted through Turnitin.***
3. ***Save a copy of your assignment before submitting it.***
4. *Assignments must be typed unless otherwise specified.*
5. *All work must be adequately and correctly referenced.*
6. *This is an individual assignment.*

Referencing Rubric

Providing evidence based on valid and referenced academic sources is a fundamental educational principle and the cornerstone of high-quality academic work. Part of achieving this quality is referencing in a way that is consistent and congruent with the requirements of the referencing style being used.

Therefore, inconsistent and/or incongruent referencing will result in a penalty of **a maximum of ten percent being deducted from the overall percentage** awarded to your assessment submission.

Please note that **evidence of plagiarism** in the form of copied or unreferenced work, absent reference lists, or exceptionally poor referencing **may result in action being taken in accordance with The IIE's Intellectual Integrity and Property Rights Policy (IIE023)**. Similarly, **evidence of excessive AI usage may result in action being taken in accordance with The IIE's Student Conduct, Discipline and Safety Policy (IIE015)**.

Markers are required to provide feedback to students by **circling/underlining the information in the table below that best describes the student's work and by adding constructive commentary where appropriate.** The examples provided are not exhaustive but illustrate the errors.

Deductions

- Where the student's work contains **five or more errors** aligned to the **minor errors column** below, **deduct 5% from the overall percentage.**
- Where the student's work contains **five or more errors** aligned to the **major errors column** below, **deduct 10% from the overall percentage.**
- **Where both minor and major errors** (e.g. two minor and three major, etc.) are present, **deduct 10% only** (and not 5% or 15%) from the overall percentage.

Required: **Consistent and congruent referencing**	**Minor errors** **Deduct 5% from overall percentage.** **Example: if the response receives 70%, deduct 5%. The final mark is 65%.**	**Major errors** **Deduct 10% from the overall percentage.** **Example: if the response receives 70%, deduct 10%. The final mark is 60%.**
Consistency • The **correct referencing style** for the **discipline** – i.e., either **Harvard**, OR **APA** (for Psychology), OR **Law**, OR **IEEE** (for ICT/Engineering) – has been used consistently for all in-text references and in the bibliography/reference list. • **Concepts** and **ideas** that are **quoted** and/or **paraphrased** are referenced consistently throughout. • **Position of the in-text reference**: an in-text reference is positioned consistently where appropriate for every quote and paraphrase.	**Minor inconsistencies:** • The referencing style used is generally consistent with what is required, but there are one or two changes/errors in the format of in-text referencing and/or in the bibliography/reference list. • For example, page numbers for direct quotes in-text have been provided for one source, but not in another. Or, two book chapters in the bibliography/reference list have been referenced in two different formats. Or, the publication year has been placed after the author name in one bibliography/reference list entry, and after the source title in another, etc. • Concepts and ideas in quotes and/or paraphrases are typically referenced, but a full in-text reference is missing or incomplete from one or two small sections of the work. • Position of the references: in-text references are only given at the beginning and/or end of every paragraph.	**Major inconsistencies:** • Poor and wholly inconsistent referencing style used in-text and/or in the bibliography/reference list. • Multiple referencing styles for the same source types have been used. • For example, the format for direct quotes in-text and/or book chapters in the bibliography/reference list and/or year of publication in the bibliography/reference list is different across multiple instances. • Concepts and ideas in quotes and/or paraphrases are haphazardly referenced in-text. • Position of the references: in-text references are only given at the beginning or end of large sections of work.
Feedback on referencing consistency:		
Congruency • **Each source** reflected within **in-text references** is included accurately in the **bibliography/reference list.** • All **bibliography/reference list** entries are in the **required order** for the referencing style used (e.g. alphabetical, alphabetical under subheadings, numerical). • All **direct quotes** and **paraphrases** have been **integrated appropriately** into the text using introductory phrases, accurate grammar, etc.	**Minor incongruences:** • There is largely a match between the sources presented in-text and those in the bibliography/reference list, but one or two sources that appear in-text do not appear in the bibliography/reference list, or vice versa. Or key source information is missing from one or two in-text references or bibliography/reference list entries only (e.g. publication year, city of publication, URL date accessed, etc.). • There is a clear and largely accurate ordering of sources in the bibliography/reference list as required by the referencing style used, but with one or two references out of order. • An attempt has been made for source integration into the text using appropriate introductory phrases and grammar, but one or two quotes or paraphrases do not flow as clearly or logically within the sentence structure as they could.	**Major incongruences:** • No relationship/several incongruencies between the in-text referencing and the bibliography/reference list. • For example, multiple sources are included in-text, but not in the bibliography, and/or vice versa. Key source information is missing from multiple in-text references and/or reference list entries. A URL link, rather than the actual reference, is provided in the bibliography. Sources are repeated in the reference list, etc. • Most sources are listed in a haphazard order throughout the bibliography/reference list. • Few to no appropriate introductory phrases or rules of grammar have been applied, and many direct quotes and/or paraphrases feel disconnected from the flow of the text.
Feedback on referencing congruency:		
Overall feedback on referencing, with suggested improvements:		

Question 1 (Marks: 30)

Imagine a large social media platform that connects millions of users around the world. Each user can create and interact with content such as text posts, photos, videos, comments, likes, shares, and more. The platform continuously collects data about user interactions and generates insights in real time.

As more users join the platform, the volume of data grows exponentially.
New features and content types (e.g., live streaming and virtual reality posts) are frequently introduced, and users generate massive amounts of data with varying formats and structures.
In this environment, the platform must store, process, and analyse the data quickly and efficiently.

Key Challenges

- High Volume of Data: With millions of users interacting with the platform, the sheer amount of data generated—posts, comments, interactions—grows rapidly.
  To accommodate this growth, the platform needs a system that can scale out horizontally (add more servers).
- Complex Data Structures: Users post different types of content (text, images, videos, GIFs) and interact with them in diverse ways (likes, shares, comments). Data structures must support this variability without enforcing rigid schema constraints.
- Real-Time Analytics: The platform needs to provide real-time analytics, such as trending topics, hot posts, and engagement metrics (e.g., likes per minute).
  This data must be updated almost instantly as new content is posted and interacted with.
- User Experience: The platform must provide a seamless user experience. Users expect instant updates on their feeds, including notifications, likes, and comments.
  Delays in updating these feeds can lead to poor engagement.

Based on the scenario outlined, provide a recommendation on whether a relational or NoSQL database should be used for data storage. In your report, include the following elements:

- A definition of the recommended database type. (2 marks)
- A detailed motivation (at least three (3) points) of why this particular type of database is being recommended. (3 x 2 = 6 marks)
- A discussion of the kinds of data that would be stored in such a database. (4 marks)

- A list and definition of four (4) types of the recommended database, with each definition consisting of at least three sentences. (4 x 3 = 12 marks marks)
- Discuss the three Vs of big data as it pertains to the scenario provided. (3 x 2 = 6 marks)

Question 2 **(Marks: 70)**

An Online Bookstore sells books and allows customers to browse, purchase, and review books. The bookstore keeps track of orders, inventory, and customer information.

Key entities in the system are:

- Customer: A person who buys books from the bookstore and reviews books.
- Book: A book available for sale in the bookstore.
- Order: An order placed by a customer for books.
- Payment: A payment made by a customer for an order.
- Review: A review written by a customer about a book.

The following relationships exist between key entities:

- A customer can place multiple orders, but each order is placed by only one customer.
- An order can contain multiple books, and a book can appear in multiple orders.
- A payment is associated with one and only one order, and an order can have one and only one payment.
- A customer can write multiple reviews, but each review is written by one customer.
- A book can have multiple reviews, and a review is written for one book.

Also consider the following business rules:

- Customer:
  - Each customer must have a unique `CustomerID`.
  - Customers provide their full name, email, and shipping address during registration.
  - An address is made up of two address lines, a suburb, and a city.
  - Each suburb belongs to a specific city.
  - Customers can have multiple orders.

- Book:
  - Each book has a unique `BookID`.
  - A book has a title, author, genre, price, and quantity in stock.
  - Multiple books can belong to the same genre.
  - Each book has only one author.
- Order:
  - Each order is uniquely identified by an `OrderID`.
  - An order contains one or more books.
  - An order is associated with one customer.
  - A customer may order more than one copy of the same book per order.
  - An order has a total price (sum of all books' prices – consider multiple copies of the same book when calculating).
  - An order can be in one of the following statuses: `Pending`, `Shipped`, or `Delivered`.
- Payment:
  - Each payment is uniquely identified by a `PaymentID`.
  - Payments include a payment date, payment amount, and a payment method.
  - Multiple payments may be made using the same payment method.
  - A payment must be associated with an order.
- Review:
  - Each review is uniquely identified by a `ReviewID`.
  - A review includes a rating (1 to 5 stars) and review text.
  - A customer can only write one review per book.
  - A book can have many reviews.

Draw an Entity Relationship Diagram (ERD) using Unified Modelling Language (UML) notation according to the background information provided at the beginning of this assignment. Your design should be at the logical level – include primary and foreign key fields and remember to remove any many-to-many relationships.

Tip: Pay attention to the mark allocation shown below.

Marks will be awarded as follows:

Entities	12 marks
Relationships	11 marks
Multiplicities	11 marks
Primary keys	14 marks
Foreign keys	12 marks
Other attributes	10 marks
Total	**70 marks**

[TOTAL MARKS:100]