**1. Understanding NoSQL Databases (8 Marks)**

**a) What are NoSQL Databases?**

NoSQL databases are designed to handle large volumes of varied and often unstructured data. Unlike traditional relational databases like Oracle, which rely on tables and fixed schemas, NoSQL databases offer a more flexible way of storing data — often in the form of documents, key-value pairs or graph. This flexibility makes them particularly useful in situations where data formats may change over time or don’t fit neatly into rows and columns; the ability to handle unstructured or semi-structured data.

**b) Comparing NoSQL and SQL Databases**

| **Parameter** | **SQL (Relational) Databases** | **NoSQL Databases** |
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| **Schema** | Fixed schema; data must match table design | Schema-less or dynamic; flexible document structure |
| **Scalability** | Scales vertically (more CPU, RAM) | Scales horizontally (more servers/nodes) |
| **Data Storage** | Stores data in tables with rows and columns | Stores data as JSON-like documents, key-values, etc. |
| **Use Cases** | Ideal for structured data with strong consistency (e.g., banking systems) | Great for big data, real-time apps, or evolving data models (e.g., social media feeds) |

**c) Real-World Use Cases for NoSQL**

**Social media**: NoSQL excels at managing vast amounts of unstructured data such as posts, comments, likes, shares, and user profiles. Its flexible schema accommodates unpredictable data and supports fast retrieval.

**IoT Applications** – Internet of Things devices generate massive streams of real-time data. NoSQL databases like MongoDB can handle this type of high-volume, rapidly changing data more efficiently than traditional SQL databases