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class : III - B.E [CS] - B

topic : MongoDB and its queries

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Introduction to MongoDB

→ MongoDB is a NoSQL, document-oriented database designed for Scalability, flexibility, and performance. Unlike traditional SQL databases (which use tables and rows), MongoDB stores data in JSON-like BSON (Binary JSON) documents. It is widely used in big data applications, real-time analytics, and cloud computing.

Key Features of MongoDB:

→ NoSQL Database - Does not use tables (or) SQL queries.

→ Document-Based - Stores data in BSON (similar to JSON.

→ Schema-less - Flexible structure, unlike relational databases

→ Scalable & High Performance - Supports Horizontal Scaling with Sharding.

supports Indexing - Improves query Performance

Aggregation Framework - Helps with complex data analytics.

Basic MongoDB Queries

1. Insert Data (create Documents)

* Single Document:

```
db.Students.insertOne({name: "John", age: 22,
                        course: "Bsc CS"})
```

* Insert multiple Documents

```
db.Students.insertmany([
  {name: 'Alice', age: 17, course: "Bsc CS"},
  {name: 'Bob', age: 23, course: "MCA"}
])
```

2. Read Data (Find Documents)

```
db.Students.find()
db.Students.find({}, {name: 1, age: 1,
                      _id: 0})
```

Retrieve all document with conditing.

```
db.Students.find({age: {$gt: 21}})
```

Finding Specific condition

db.Products.find({color:"blue"})

→This returns all documents in Product collection where the color field is "blue".

3) update Data

→update one document

db.students.updateone({name:"John"},
{$set:{age:23}})

→update multiple documents

db.students.updateMany({course:
"BSc CS"},{$set:{status:"Active"}})

4) Delete Data

→Delete one document:

db.students.deleteOne({name:"Alice"})

→Delete multiple document:

db.students.deleteMany({course:
"MCA"})

Aggregation (Data Analysis Queries)

→ Calculate the average age of Students:

```
db.students.aggregate([
  { $group: { _id: null, avgAge:
  { $avg: "$age" } } }
])
```

→ Count the number of students in each course:

```
db.students.aggregate([
  { $group: { _id: "$course", count:
      { $sum: 1 } } }
])
```

→ Find the oldest student

```
db.students.find().sort({ age: -1
}).limit(1)
```

→ MongoDB is a powerful NoSQL database for bigdata, real-time application used and analytics. MongoDB is most widely Database.