Assignment No.9

Name : Shailesh Pawar

PRN : 123B1B230

1. Insert Sample Data into zipcode_230

```
db.zipcode_230.insertMany([
  { _id: 1, city: "New York", state: "NY", pop: 8000000 },
  { _id: 2, city: "Buffalo", state: "NY", pop: 3000000 },
  { _id: 3, city: "Los Angeles", state: "CA", pop: 10000000 },
  { _id: 4, city: "San Diego", state: "CA", pop: 2000000 },
  { _id: 5, city: "Chicago", state: "IL", pop: 7000000 },
  { _id: 6, city: "Springfield", state: "IL", pop: 500000 }
]);
```

2. Insert Sample Data into Teachers_230

```
db.Teachers_230.insertMany([
  { Tname: "Alice", dname: "CSE", salary: 20000, experience: 5 },
  { Tname: "Bob", dname: "CSE", salary: 25000, experience: 7 },
  { Tname: "Charlie", dname: "IT", salary: 22000, experience: 4 },
  { Tname: "David", dname: "ENTC", salary: 15000, experience: 3 },
  { Tname: "Eva", dname: "ENTC", salary: 18000, experience: 6 },
  { Tname: "Fiona", dname: "IT", salary: 28000, experience: 8 },
  { Tname: "George", dname: "CSE", salary: 24000, experience: 6 }
]);
```

3. Insert Sample Data into Students_230

```
db.Students_230.insertMany([
  { roll_no: 101, name: "John", branch: "CSE", year: 2 },
  { roll_no: 102, name: "Mary", branch: "CSE", year: 3 },
  { roll_no: 103, name: "Steve", branch: "ENTC", year: 2 },
  { roll_no: 104, name: "Anna", branch: "IT", year: 1 },
  { roll_no: 105, name: "Paul", branch: "ENTC", year: 4 }
]);
```

4. States with population > 10 million

Code :

```
db.zipcode_230.aggregate([
  { $group: { _id: "$state", totalPop: { $sum: "$pop" } } },
  { $match: { totalPop: { $gt: 10000000 } } }
]);
```

Output :

```
population> db.zipcode_230.aggregate([
...   { $group: { _id: "$state", totalPop: { $sum: "$pop" } } },
...   { $match: { totalPop: { $gt: 10000000 } } }
... ]);
...
[
  { _id: 'CA', totalPop: 12000000 },
  { _id: 'NY', totalPop: 11000000 }
]
```

5. Department-wise average salary

```
db.Teachers_230.aggregate([
  { $group: { _id: "$dname", avgSalary: { $avg: "$salary" } } }
]);
```

```
population> db.Teachers_230.aggregate([
...   { $group: { _id: "$dname", avgSalary: { $avg: "$salary" } } }
... ]);
...
[
  { _id: 'CSE', avgSalary: 23000 },
  { _id: 'IT', avgSalary: 25000 },
  { _id: 'ENTC', avgSalary: 16500 }
]
population>
```

6. Number of employees in each department

```
db.Teachers_230.aggregate([
  { $group: { _id: "$dname", totalEmployees: { $sum: 1 } } }
]);
```

```
population> db.Teachers_230.aggregate([
...   { $group: { _id: "$dname", totalEmployees: { $sum: 1 } } }
... ]);
...
[
  { _id: 'CSE', totalEmployees: 3 },
  { _id: 'IT', totalEmployees: 2 },
  { _id: 'ENTC', totalEmployees: 2 }
]
```

7. Department-wise total salary ≥ 50000

```
db.Teachers_230.aggregate([
  { $group: { _id: "$dname", totalSalary: { $sum: "$salary" } } },
```

```
  { $match: { totalSalary: { $gte: 50000 } } }
]);
```

```
population> db.Teachers_230.aggregate([
...   { $group: { _id: "$dname", totalSalary: { $sum: "$salary" } } },
...   { $match: { totalSalary: { $gte: 50000 } } }
... ]);
...
[
  { _id: 'CSE', totalSalary: 69000 },
  { _id: 'IT', totalSalary: 50000 }
]
```

8. Aggregation using $min, $max, $avg, $sum

```
db.Teachers_230.aggregate([
  {
    $group: {
      _id: null,
      minSalary: { $min: "$salary" },
      maxSalary: { $max: "$salary" },
      avgExp: { $avg: "$experience" },
      totalSal: { $sum: "$salary" }
    }
  }
]);
```

```
population> db.Teachers_230.aggregate([
...   {
...     $group: {
...       _id: null,
...       minSalary: { $min: "$salary" },
...       maxSalary: { $max: "$salary" },
...       avgExp: { $avg: "$experience" },
...       totalSal: { $sum: "$salary" }
...     }
...   }
... ]);
...
[
  {
    _id: null,
    minSalary: 15000,
    maxSalary: 28000,
    avgExp: 5.571428571428571,
    totalSal: 152000
  }
]
```

9. Create simple index on roll_no
db.Students_230.createIndex({ roll_no: 1 });

```
roll_no_1
```

10. Create unique index on Tname
db.Teachers_230.createIndex({ Tname: 1 }, { unique: true });

```
Tname_1
```

11. Create compound index on dname and salary
db.Teachers_230.createIndex({ dname: 1, salary: -1 });

```
population> db.Teachers_230.createIndex({ dname: 1, salary: -1 });
dname_1_salary_-1
```

12. Show all indexes created in database PCCOE_230
db.getCollectionNames().forEach(function(coll) {
  print("Indexes for collection: " + coll);

```
  printjson(db.getCollection(coll).getIndexes());
});
```

```
...
Indexes for collection: zipcode_230
[
  {
    v: 2,
    key: {
      _id: 1
    },
    name: '_id_'
  }
]
Indexes for collection: Students_230
[
  {
    v: 2,
    key: {
      _id: 1
    },
    name: '_id_'
  },
  {
    v: 2,
    key: {
      roll_no: 1
    },
    name: 'roll_no_1'
  }
]
```

```
Indexes for collection: Teachers_230
[
  {
    v: 2,
    key: {
      _id: 1
    },
    name: '_id_'
  },
  {
    v: 2,
    key: {
      Tname: 1
    },
    name: 'Tname_1',
    unique: true
  },
  {
    v: 2,
    key: {
      dname: 1,
      salary: -1
    },
    name: 'dname_1_salary_-1'
  }
]
```

13. Show all indexes in individual collections
db.Teachers_230.getIndexes();
db.Students_230.getIndexes();

```
population> db.Teachers_230.getIndexes();
... db.Students_230.getIndexes();
...
[
  { v: 2, key: { _id: 1 }, name: '_id_' },
  { v: 2, key: { roll_no: 1 }, name: 'roll_no_1' }
]
```