

## A. Creation of tables, defining constraints, and demonstrating SQL objects such as views, indexes, sequences, and synonyms.

```
Select Command Prompt - mysql -u root -p
mysql> create database A2;
Query OK, 1 row affected (0.10 sec)

mysql> use A2;
Database changed
mysql>
mysql> -- 1. Department Table
mysql> create table dept(
  ->     dept_id int primary key,
  ->     dept_name varchar(50) unique not null
  -> );
Query OK, 0 rows affected (0.14 sec)

mysql>
mysql> desc dept;
+-----+-----+-----+-----+-----+-----+
| Field      | Type          | Null | Key | Default | Extra |
+-----+-----+-----+-----+-----+-----+
| dept_id    | int           | NO   | PRI | NULL    |       |
| dept_name  | varchar(50)   | NO   | UNI | NULL    |       |
+-----+-----+-----+-----+-----+-----+
2 rows in set (0.04 sec)

mysql> select * from dept;
Empty set (0.01 sec)

mysql>
mysql> -- 2. Instructor Table
mysql> create table instructor(
  ->     instr_id int primary key,
  ->     instr_name varchar(100) not null,
  ->     salary decimal(10,2) check(salary >= 0),
  ->     dept_id int,
  ->     constraint fk_instr foreign key(dept_id) references dept(dept_id)
  -> );
Query OK, 0 rows affected (0.07 sec)

mysql>
mysql> desc instructor;
+-----+-----+-----+-----+-----+-----+
| Field      | Type          | Null | Key | Default | Extra |
+-----+-----+-----+-----+-----+-----+
| instr_id   | int           | NO   | PRI | NULL    |       |
| instr_name | varchar(100)  | NO   |     | NULL    |       |
| salary     | decimal(10,2) | YES  |     | NULL    |       |
| dept_id    | int           | YES  | MUL | NULL    |       |
+-----+-----+-----+-----+-----+-----+
4 rows in set (0.00 sec)

mysql> select * from instructor;
```

```
mysql> select * from instructor;
Empty set (0.00 sec)

mysql>
mysql> -- 3. Student Table
mysql> create table student(
  ->     stud_id int primary key,
  ->     stud_name varchar(100),
  ->     dept_id int,
  ->     constraint fk_stud foreign key(dept_id) references dept(dept_id)
  -> );
Query OK, 0 rows affected (0.06 sec)

mysql>
mysql> desc student;
+-----+-----+-----+-----+-----+-----+
| Field      | Type          | Null | Key | Default | Extra |
+-----+-----+-----+-----+-----+-----+
| stud_id    | int           | NO   | PRI | NULL    |       |
| stud_name  | varchar(100)  | YES  |     | NULL    |       |
| dept_id    | int           | YES  | MUL | NULL    |       |
+-----+-----+-----+-----+-----+-----+
3 rows in set (0.00 sec)
```

Select Command Prompt - mysql -u root -p

```
mysql> -- 4. Course Table
mysql> create table course(
  ->   course_id varchar(20) primary key,
  ->   title varchar(100),
  ->   credits int check(credits > 0),
  ->   dept_id int,
  ->   constraint fk_course foreign key(dept_id) references dept(dept_id)
  -> );
Query OK, 0 rows affected (0.10 sec)
```

```
mysql>
mysql> desc course;
```

Field	Type	Null	Key	Default	Extra
course_id	varchar(20)	NO	PRI	NULL	
title	varchar(100)	YES		NULL	
credits	int	YES		NULL	
dept_id	int	YES	MUL	NULL	

4 rows in set (0.00 sec)

```
mysql> select * from course;
Empty set (0.00 sec)
```

```
mysql>
mysql> -- 5. Company Table
mysql> create table company(
  ->   comp_id int primary key,
  ->   comp_name varchar(100) unique,
  ->   city varchar(100)
  -> );
Query OK, 0 rows affected (0.07 sec)
```

```
mysql>
mysql> desc company;
```

Field	Type	Null	Key	Default	Extra
comp_id	int	NO	PRI	NULL	
comp_name	varchar(100)	YES	UNI	NULL	
city	varchar(100)	YES		NULL	

3 rows in set (0.00 sec)

```
mysql> -- 6. Employee Table
mysql> create table employee(
  ->   emp_id int primary key,
  ->   emp_name varchar(100),
  ->   salary decimal(10,2)
  -> );
Query OK, 0 rows affected (0.03 sec)
```

```
mysql>
mysql> desc employee;
```

Field	Type	Null	Key	Default	Extra
emp_id	int	NO	PRI	NULL	
emp_name	varchar(100)	YES		NULL	
salary	decimal(10,2)	YES		NULL	

3 rows in set (0.01 sec)

```
mysql> select * from employee;
Empty set (0.00 sec)
```

```
mysql>
mysql> -- 7. Employee-Company Table
mysql> create table emp_comp(
  ->   emp_id int,
  ->   comp_id int,
  ->   primary key(emp_id, comp_id),
  ->   foreign key(emp_id) references employee(emp_id),
  ->   foreign key(comp_id) references company(comp_id)
  -> );
Query OK, 0 rows affected (0.09 sec)
```

```
mysql>
mysql> desc emp_comp;
```

Field	Type	Null	Key	Default	Extra
emp_id	int	NO	PRI	NULL	
comp_id	int	NO	PRI	NULL	

2 rows in set (0.01 sec)

```
mysql> -- 8. View
mysql> create view instr_dept_view as
  -> select i.instr_id, i.instr_name, d.dept_name, i.salary
  -> from instructor i join dept d on i.dept_id = d.dept_id;
Query OK, 0 rows affected (0.01 sec)

mysql>
mysql> desc instr_dept_view;
+-----+-----+-----+-----+-----+-----+
| Field | Type          | Null | Key | Default | Extra |
+-----+-----+-----+-----+-----+-----+
| instr_id | int          | NO   |     | NULL    |       |
| instr_name | varchar(100) | NO   |     | NULL    |       |
| dept_name | varchar(50)  | NO   |     | NULL    |       |
| salary    | decimal(10,2) | YES  |     | NULL    |       |
+-----+-----+-----+-----+-----+-----+
4 rows in set (0.00 sec)

mysql> select * from instr_dept_view;
Empty set (0.00 sec)

mysql>
mysql> -- 9. Index
mysql> create index idx_instr_salary on instructor(salary);
Query OK, 0 rows affected (0.03 sec)
Records: 0 Duplicates: 0 Warnings: 0
```

```
mysql> -- Insert Data
mysql> insert into dept (dept_id, dept_name) values
  -> (1,'Computer Science'),
  -> (2,'Information Technology'),
  -> (3,'Mechanical');
Query OK, 3 rows affected (0.01 sec)
Records: 3 Duplicates: 0 Warnings: 0

mysql>
mysql> insert into instructor (instr_id, instr_name, salary, dept_id) values
  -> (1,'Ramesh',80000,1),
  -> (2,'Suresh',75000,2),
  -> (3,'Anil',90000,1),
  -> (4,'Sunita',70000,3);
Query OK, 4 rows affected (0.01 sec)
Records: 4 Duplicates: 0 Warnings: 0

mysql>
mysql> insert into student (stud_id, stud_name, dept_id) values
  -> (1,'Rahul',1),
  -> (2,'Neha',2),
  -> (3,'Amit',3);
Query OK, 3 rows affected (0.00 sec)
Records: 3 Duplicates: 0 Warnings: 0

mysql>
mysql> insert into course (course_id, title, credits, dept_id) values
  -> ('CS101','DBMS',3,1),
  -> ('CS102','Operating Systems',4,1),
  -> ('IT101','Networking',3,2),
  -> ('ME101','Thermodynamics',3,3);
Query OK, 4 rows affected (0.00 sec)
Records: 4 Duplicates: 0 Warnings: 0

mysql>
mysql> insert into company (comp_id, comp_name, city) values
  -> (1,'TCS','Mumbai'),
  -> (2,'Infosys','Pune'),
  -> (3,'Wipro','Bangalore');
Query OK, 3 rows affected (0.01 sec)
Records: 3 Duplicates: 0 Warnings: 0
```

```
mysql> insert into employee (emp_id, emp_name, salary) values
  -> (1,'Rajesh',50000),
  -> (2,'Deepak',45000),
  -> (3,'Kavita',60000);
Query OK, 3 rows affected (0.01 sec)
Records: 3 Duplicates: 0 Warnings: 0

mysql>
mysql> insert into emp_comp (emp_id, comp_id) values
  -> (1,1),
  -> (2,1),
  -> (3,2);
Query OK, 3 rows affected (0.00 sec)
Records: 3 Duplicates: 0 Warnings: 0
```

```
mysql> -- Final check
mysql> select * from dept;
```

dept_id	dept_name
1	Computer Science
2	Information Technology
3	Mechanical

```
3 rows in set (0.00 sec)
```

```
mysql> select * from instructor;
```

instr_id	instr_name	salary	dept_id
1	Ramesh	80000.00	1
2	Suresh	75000.00	2
3	Anil	90000.00	1
4	Sunita	70000.00	3

```
4 rows in set (0.00 sec)
```

```
mysql> select * from student;
```

stud_id	stud_name	dept_id
1	Rahul	1
2	Neha	2
3	Amit	3

```
3 rows in set (0.00 sec)
```

```
mysql> select * from course;
```

course_id	title	credits	dept_id
CS101	DBMS	3	1
CS102	Operating Systems	4	1
IT101	Networking	3	2
ME101	Thermodynamics	3	3

```
4 rows in set (0.00 sec)
```

```
mysql> select * from company;
```

comp_id	comp_name	city
1	TCS	Mumbai
2	Infosys	Pune
3	Wipro	Bangalore

```
3 rows in set (0.00 sec)
```

```
mysql> select * from employee;
```

emp_id	emp_name	salary
1	Rajesh	50000.00
2	Deepak	45000.00
3	Kavita	60000.00

```
3 rows in set (0.00 sec)
```

```
mysql> select * from emp_comp;
```

emp_id	comp_id
1	1
2	1
3	2

```
3 rows in set (0.00 sec)
```

```
mysql> select * from instr_dept_view;
```

instr_id	instr_name	dept_name	salary
1	Ramesh	Computer Science	80000.00
3	Anil	Computer Science	90000.00
2	Suresh	Information Technology	75000.00
4	Sunita	Mechanical	70000.00

```
4 rows in set (0.00 sec)
```

**B. Data manipulation: inserting, selecting, updating, deleting, using functions, operators, joins, aggregates, and set operations.**

```
mysql> use A2;
Database changed
mysql> -- 1. List all students
mysql> select * from student;
+-----+-----+-----+
| stud_id | stud_name | dept_id |
+-----+-----+-----+
|      1 | Rahul    |      1 |
|      2 | Neha     |      2 |
|      3 | Amit     |      3 |
+-----+-----+-----+
3 rows in set (0.09 sec)

mysql>
mysql> -- 2. Titles of courses in 'Computer Science' with 3 credits
mysql> select title from course c join dept d on c.dept_id=d.dept_id
-> where d.dept_name='Computer Science' and c.credits=3;
+-----+
| title |
+-----+
| DBMS  |
+-----+
1 row in set (0.01 sec)

mysql>
mysql> -- 3. Names of instructors in 'Information Technology' earning > 70000
mysql> select instr_name from instructor i join dept d on i.dept_id=d.dept_id
-> where d.dept_name='Information Technology' and i.salary>70000;
+-----+
| instr_name |
+-----+
| Suresh     |
+-----+
1 row in set (0.00 sec)

mysql>
mysql> -- 4. IDs & titles of courses taught by 'Ramesh'
mysql> select distinct c.course_id, c.title
-> from course c join dept d on c.dept_id=d.dept_id
-> join instructor i on i.dept_id=d.dept_id
-> where i.instr_name='Ramesh';
+-----+-----+
| course_id | title                |
+-----+-----+
| CS101     | DBMS                 |
| CS102     | Operating Systems    |
+-----+-----+
2 rows in set (0.01 sec)

mysql> -- 5. Course IDs starting with 'CS'
mysql> select course_id from course where course_id like 'CS%';
+-----+
| course_id |
+-----+
| CS101     |
| CS102     |
+-----+
2 rows in set (0.01 sec)

mysql>
mysql> -- 6. Course titles containing 'DBMS'
mysql> select title from course where title like '%DBMS%';
+-----+
| title |
+-----+
| DBMS  |
+-----+
1 row in set (0.00 sec)
```

```
mysql>
mysql> -- 7. Highest and lowest salary of instructors
mysql> select max(salary) as highest, min(salary) as lowest from instructor;
+-----+-----+
| highest | lowest |
+-----+-----+
| 90000.00 | 70000.00 |
+-----+-----+
1 row in set (0.01 sec)

mysql>
mysql> -- 8. Maximum salary per department
mysql> select d.dept_name, max(i.salary) as max_salary
-> from instructor i join dept d on i.dept_id=d.dept_id
-> group by d.dept_name;
+-----+-----+
| dept_name | max_salary |
+-----+-----+
| Computer Science | 90000.00 |
| Information Technology | 75000.00 |
| Mechanical | 70000.00 |
+-----+-----+
3 rows in set (0.00 sec)

mysql>
mysql> -- 9. Increase salary by 10% for 'Computer Science' instructors earning < 85000
mysql> update instructor set salary=salary*1.1
-> where dept_id=(select dept_id from dept where dept_name='Computer Science')
-> and salary < 85000;
Query OK, 1 row affected (0.01 sec)
Rows matched: 1 Changed: 1 Warnings: 0

mysql>
mysql> -- 10. Delete courses with credits < 3
mysql> delete from course where credits<3;
Query OK, 0 rows affected (0.00 sec)

mysql>
mysql> -- 11. Count of employees working at 'TCS'
mysql> select count(*) as emp_count
-> from emp_comp ec join company c on ec.comp_id=c.comp_id
-> where c.comp_name='TCS';
+-----+
| emp_count |
+-----+
| 2 |
+-----+
1 row in set (0.00 sec)

mysql>
mysql> -- 12. Number of employees in each company
mysql> select c.comp_name, count(ec.emp_id) as emp_count
-> from company c left join emp_comp ec on c.comp_id=ec.comp_id
-> group by c.comp_name;
+-----+-----+
| comp_name | emp_count |
+-----+-----+
| Infosys | 1 |
| TCS | 2 |
| Wipro | 0 |
+-----+-----+
3 rows in set (0.00 sec)
```

```

mysql> -- 13. Average salary per company excluding 'TCS'
mysql> select c.comp_name, avg(e.salary) as avg_salary
  -> from company c join emp_comp ec on c.comp_id=ec.comp_id
  -> join employee e on e.emp_id=ec.emp_id
  -> where c.comp_name <> 'TCS'
  -> group by c.comp_name;
+-----+-----+
| comp_name | avg_salary |
+-----+-----+
| Infosys   | 60000.000000 |
+-----+-----+
1 row in set (0.00 sec)

mysql>
mysql> -- 14. Employees with salary greater than average
mysql> select emp_name, salary from employee
  -> where salary > (select avg(salary) from employee);
+-----+-----+
| emp_name | salary |
+-----+-----+
| Kavita   | 60000.00 |
+-----+-----+
1 row in set (0.00 sec)

mysql>
mysql> -- 15. Departments with no students
mysql> select d.dept_name
  -> from dept d
  -> where d.dept_id not in (select distinct dept_id from student);
Empty set (0.00 sec)

mysql>

```

## C. Insem 2025 Queries

```
mysql> create database A2_3;
Query OK, 1 row affected (0.01 sec)

mysql> use A2_3;
Database changed
mysql>
mysql> create table emp(
  ->     emp_no int primary key,
  ->     emp_name varchar(100),
  ->     dept_no int
  -> );
Query OK, 0 rows affected (0.03 sec)

mysql>
mysql> desc emp;
+-----+-----+-----+-----+-----+-----+
| Field      | Type          | Null | Key | Default | Extra |
+-----+-----+-----+-----+-----+-----+
| emp_no     | int           | NO   | PRI | NULL    |       |
| emp_name   | varchar(100)  | YES  |     | NULL    |       |
| dept_no    | int           | YES  |     | NULL    |       |
+-----+-----+-----+-----+-----+-----+
3 rows in set (0.00 sec)

mysql> select * from emp;
Empty set (0.00 sec)

mysql>
mysql> create table dept_insem(
  ->     dept_no int primary key,
  ->     dept_name varchar(50)
  -> );
Query OK, 0 rows affected (0.02 sec)

mysql>
mysql> desc dept_insem;
+-----+-----+-----+-----+-----+-----+
| Field      | Type          | Null | Key | Default | Extra |
+-----+-----+-----+-----+-----+-----+
| dept_no    | int           | NO   | PRI | NULL    |       |
| dept_name  | varchar(50)   | YES  |     | NULL    |       |
+-----+-----+-----+-----+-----+-----+
2 rows in set (0.00 sec)

mysql> select * from dept_insem;
Empty set (0.00 sec)

mysql> insert into dept_insem (dept_no, dept_name) values
  -> (1,'Computer Science'),
  -> (2,'Information Technology'),
  -> (3,'Mechanical');
Query OK, 3 rows affected (0.00 sec)
Records: 3  Duplicates: 0  Warnings: 0

mysql> insert into emp (emp_no, emp_name, dept_no) values
  -> (1,'Ram',1),
  -> (2,'Shyam',2),
  -> (3,'Sita',1),
  -> (4,'Pooja',3);
Query OK, 4 rows affected (0.00 sec)
Records: 4  Duplicates: 0  Warnings: 0
```



```
mysql> select * from dept_insem;
+-----+-----+
| dept_no | dept_name |
+-----+-----+
|      1 | Computer Science |
|      2 | Information Technology |
|      3 | Mechanical |
+-----+-----+
```

3 rows in set (0.00 sec)

```
mysql> select * from emp;
+-----+-----+-----+
| emp_no | emp_name | dept_no |
+-----+-----+-----+
|      1 | Ram      |      1 |
|      2 | Shyam    |      2 |
|      3 | Sita     |      1 |
|      4 | Pooja    |      3 |
+-----+-----+-----+
```

4 rows in set (0.00 sec)

```
mysql> select dept_name from dept_insem
-> where dept_no = (
->   select dept_no from emp
->   where emp_name='Ram'
-> );
```

```
+-----+
| dept_name |
+-----+
| Computer Science |
+-----+
```

1 row in set (0.00 sec)

```
mysql>
mysql> select d.dept_name
-> from emp e
-> join dept_insem d on e.dept_no = d.dept_no
-> where e.emp_name='Ram';
```

```
+-----+
| dept_name |
+-----+
| Computer Science |
+-----+
```

1 row in set (0.00 sec)

```
mysql>
mysql>
mysql> create view emp_count_view as
-> select d.dept_name, count(e.emp_no) as total_emp
-> from dept_insem d
-> left join emp e on d.dept_no = e.dept_no
-> group by d.dept_name
-> order by total_emp asc;
```

Query OK, 0 rows affected (0.00 sec)

```
mysql>
mysql> desc emp_count_view;
```

```
+-----+-----+-----+-----+-----+-----+
| Field | Type | Null | Key | Default | Extra |
+-----+-----+-----+-----+-----+-----+
| dept_name | varchar(50) | YES | | NULL | |
| total_emp | bigint | NO | | 0 | |
+-----+-----+-----+-----+-----+-----+
```

2 rows in set (0.00 sec)

```
mysql> select * from emp_count_view;
```

dept_name	total_emp
Information Technology	1
Mechanical	1
Computer Science	2

```
3 rows in set (0.00 sec)
```

```
mysql>
```

```
mysql> select dept_name from dept_insem
```

```
-> where dept_no not in (select distinct dept_no from emp);
```

```
Empty set (0.00 sec)
```

```
mysql>
```

```
mysql> select d.dept_name
```

```
-> from dept_insem d
```

```
-> left join emp e on d.dept_no = e.dept_no
```

```
-> where e.emp_no is null;
```

```
Empty set (0.00 sec)
```

```
mysql>
```

```
mysql> select dept_name from dept_insem
```

```
-> except
```

```
-> select d.dept_name
```

```
-> from dept_insem d join emp e on d.dept_no=e.dept_no;
```

```
Empty set (0.00 sec)
```