Roll NO: 42

Name: Senna Anto

DBMS LAB CYCLE-1

Q1. Design and built a simple relational database system and demonstrate competence with the fundamental tasks involved with modelling, designing and implementing a database.

DDL Commands:

1. Create the database named CYBERCOLLEGE and the above tables in the CYBERCOLLEGE database include the Primary Key Constraint, Referential Integrity Constraints, and Check Constraints.

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

mysql> use database cyber_college;
ERROR 1049 (42000): Unknown database 'database'
mysql> create database cyber_college;
ERROR 1007 (HY000): Can't create database 'cyber_college'; database exists
mysql> use database cyber_college;
ERROR 1049 (42000): Unknown database 'database'
mysql> use  cyber_college;
Database changed
mysql> create table student(stud_no char(9) primary key,stud_fname char(20),stu
```

Table:- STUDENT

```
mysql> create table student(stud_no char(9) primary key,stud_fname char(20),stud_lname char(30),address char(50),city ch
ar(30),state char(2),postal_code char(9));
Query OK, 0 rows affected (0.05 sec)
```

```
mysql> desc student;
+-------------+----------+------+-----+---------+-------+
| Field       | Type     | Null | Key | Default | Extra |
+-------------+----------+------+-----+---------+-------+
| stud_no     | char(9)  | NO   | PRI | NULL    |       |
| stud_fname  | char(20) | YES  |     | NULL    |       |
| stud_lname  | char(30) | YES  |     | NULL    |       |
| address     | char(50) | YES  |     | NULL    |       |
| city        | char(30) | YES  |     | NULL    |       |
| state       | char(2)  | YES  |     | NULL    |       |
| postal_code | char(9)  | YES  |     | NULL    |       |
+-------------+----------+------+-----+---------+-------+
7 rows in set (0.01 sec)
```

Table:- INSTRUCTOR

```
mysql> create table instructor(inst_id char(5) primary key,inst_fname char(25),inst_lname char(30),inst_phn char(8));
Query OK, 0 rows affected (0.03 sec)
```

```
mysql> desc instructor;
+-------------+----------+------+-----+---------+-------+
| Field       | Type     | Null | Key | Default | Extra |
+-------------+----------+------+-----+---------+-------+
| inst_id     | char(5)  | NO   | PRI | NULL    |       |
| inst_fname  | char(25) | YES  |     | NULL    |       |
| inst_lname  | char(30) | YES  |     | NULL    |       |
| inst_phn    | char(8)  | YES  |     | NULL    |       |
+-------------+----------+------+-----+---------+-------+
4 rows in set (0.01 sec)
```

Table:-COURSE

```
mysql> create table course(course_code char(6) primary key,course_title char(25),course_hour numeric(2,0));
Query OK, 0 rows affected (0.03 sec)
```

```
mysql> desc course;
+--------------+-------------+------+-----+---------+-------+
| Field        | Type        | Null | Key | Default | Extra |
+--------------+-------------+------+-----+---------+-------+
| course_code  | char(6)     | NO   | PRI | NULL    |       |
| course_title | char(25)    | YES  |     | NULL    |       |
| course_hour  | decimal(2,0)| YES  |     | NULL    |       |
+--------------+-------------+------+-----+---------+-------+
3 rows in set (0.00 sec)
```

Table:-ENROLLMENT

```
mysql> create table enrollment(stud_no char(9) references student (stud_no),sec_id char(7) references section (sec_id),g
rade char(2));
Query OK, 0 rows affected (0.03 sec)

mysql> desc enrollment;
+---------+---------+------+-----+---------+-------+
| Field   | Type    | Null | Key | Default | Extra |
+---------+---------+------+-----+---------+-------+
| stud_no | char(9) | YES  |     | NULL    |       |
| sec_id  | char(7) | YES  |     | NULL    |       |
| grade   | char(2) | YES  |     | NULL    |       |
+---------+---------+------+-----+---------+-------+
3 rows in set (0.00 sec)
```

Table:-SECTION

```
mysql> create table section2(section_id numeric primary key,time_offered varchar(10),days_offered varchar(8),class_size
numeric(3,0),check(class_size>-0),number_enrolled numeric(3,0),check(number_enrolled>-0),inst_id char(9) references inst
ructor(inst_id),course_code char(6) references course(course_code));
Query OK, 0 rows affected (0.06 sec)
```

```
mysql> desc section2;
+-----------------+--------------+------+-----+---------+-------+
| Field           | Type         | Null | Key | Default | Extra |
+-----------------+--------------+------+-----+---------+-------+
| section_id      | decimal(10,0)| NO   | PRI | NULL    |       |
| time_offered    | varchar(10)  | YES  |     | NULL    |       |
| days_offered    | varchar(8)   | YES  |     | NULL    |       |
| class_size      | decimal(3,0) | YES  |     | NULL    |       |
| number_enrolled | decimal(3,0) | YES  |     | NULL    |       |
| inst_id         | char(9)      | YES  |     | NULL    |       |
| course_code     | char(6)      | YES  |     | NULL    |       |
+-----------------+--------------+------+-----+---------+-------+
7 rows in set (0.01 sec)
```

2. Add a field Country to the STUDENT table with the default values set to "India"

```
mysql> desc student;
+-------------+----------+------+-----+---------+-------+
| Field       | Type     | Null | Key | Default | Extra |
+-------------+----------+------+-----+---------+-------+
| stud_no     | char(9)  | NO   | PRI | NULL    |       |
| stud_fname  | char(20) | YES  |     | NULL    |       |
| stud_lname  | char(30) | YES  |     | NULL    |       |
| address     | char(50) | YES  |     | NULL    |       |
| city        | char(30) | YES  |     | NULL    |       |
| state       | char(2)  | YES  |     | NULL    |       |
| postal_code | char(9)  | YES  |     | NULL    |       |
+-------------+----------+------+-----+---------+-------+
7 rows in set (0.00 sec)
```

```
mysql> alter table student add country char(20) default 'INDIA';
Query OK, 0 rows affected (0.03 sec)
Records: 0  Duplicates: 0  Warnings: 0

mysql> desc student;
+-------------+----------+------+-----+---------+-------+
| Field       | Type     | Null | Key | Default | Extra |
+-------------+----------+------+-----+---------+-------+
| stud_no     | char(9)  | NO   | PRI | NULL    |       |
| stud_fname  | char(20) | YES  |     | NULL    |       |
| stud_lname  | char(30) | YES  |     | NULL    |       |
| address     | char(50) | YES  |     | NULL    |       |
| city        | char(30) | YES  |     | NULL    |       |
| state       | char(2)  | YES  |     | NULL    |       |
| postal_code | char(9)  | YES  |     | NULL    |       |
| country     | char(20) | YES  |     | INDIA   |       |
+-------------+----------+------+-----+---------+-------+
8 rows in set (0.01 sec)
```

3. Add a constraint to the Grade field in the ENROLMENT table that accepts only the values A, B, C and D.

```
mysql> alter table enrollment add constraint grade check(grade='a' or grade='b' or grade='c');
Query OK, 0 rows affected (0.08 sec)
Records: 0  Duplicates: 0  Warnings: 0
```

4. Modify the ENROLMENT table by changing the width of the field Grade to 2.

```
mysql> alter table enrollment modify grade char(1);
Query OK, 0 rows affected (0.07 sec)
Records: 0  Duplicates: 0  Warnings: 0
```

5. Add a new column, salary to the INSTRUCTOR table and display its modified schema.

```
mysql> alter table enrollment add salary varchar(20);
Query OK, 0 rows affected (0.03 sec)
Records: 0  Duplicates: 0  Warnings: 0

mysql> desc instructor;
+-------------+-------------+------+-----+---------+-------+
| Field       | Type        | Null | Key | Default | Extra |
+-------------+-------------+------+-----+---------+-------+
| inst_id     | char(5)     | NO   | PRI | NULL    |       |
| inst_fname  | char(25)    | YES  |     | NULL    |       |
| inst_lname  | char(30)    | YES  |     | NULL    |       |
| inst_phn    | char(8)     | YES  |     | NULL    |       |
| inst_mailid | char(15)    | YES  |     | NULL    |       |
| salary      | varchar(20) | YES  |     | NULL    |       |
+-------------+-------------+------+-----+---------+-------+
6 rows in set (0.01 sec)
```

6. Drop the column Country from the STUDENT table.

```
mysql> alter table student drop country;
Query OK, 0 rows affected (0.05 sec)
Records: 0  Duplicates: 0  Warnings: 0

mysql> desc student;
+-------------+----------+------+-----+---------+-------+
| Field       | Type     | Null | Key | Default | Extra |
+-------------+----------+------+-----+---------+-------+
| stud_no     | char(9)  | NO   | PRI | NULL    |       |
| stud_fname  | char(20) | YES  |     | NULL    |       |
| stud_lname  | char(30) | YES  |     | NULL    |       |
| address     | char(50) | YES  |     | NULL    |       |
| city        | char(30) | YES  |     | NULL    |       |
| state       | char(2)  | YES  |     | NULL    |       |
| postal_code | char(9)  | YES  |     | NULL    |       |
+-------------+----------+------+-----+---------+-------+
7 rows in set (0.00 sec)
```

7. Create a view for instructors to display the courses taught by an instructor. Display the personal details but by hiding salary information.

```
mysql> create view inst as select i.inst_id,i.inst_fname,i.inst_lname,i.inst_phn,c.course_title from instructor i join course c join
 section1  s where i.inst_id=s.inst_id and s.course_code=c.course_code;
Query OK, 0 rows affected (0.04 sec)

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

mysql>
```

8. Insert details of you and your 5 friends in STUDENT table and the details of 5 instructors with names (Asha, Ashna, Sandeep, Asifa, George) in INSTRUCTOR table.

```
mysql> insert into student values(101,'senna','anto','amballur','thrissur','kl',680302);
Query OK, 1 row affected (0.01 sec)

mysql> insert into student values(102,'riya','jose','ernakulam','thrissur','kl',680302);
Query OK, 1 row affected (0.02 sec)

mysql> insert into student values(103,'anjali','salvin','kalady','ernakulam','kl',680302);
Query OK, 1 row affected (0.01 sec)

mysql> insert into student values(104,'alwin','shaju','manjapra','ernakulam','kl',680302);
Query OK, 1 row affected (0.00 sec)

mysql> insert into student values(105,'alfred','george','vendore','thrissur','kl',680302);
Query OK, 1 row affected (0.01 sec)

mysql> select * from student;
+---------+------------+------------+-----------+-----------+-------+-------------+
| stud_no | stud_fname | stud_lname | address   | city      | state | postal_code |
+---------+------------+------------+-----------+-----------+-------+-------------+
| 101     | senna      | anto       | amballur  | thrissur  | kl    | 680302      |
| 102     | riya       | jose       | ernakulam | thrissur  | kl    | 680302      |
| 103     | anjali     | salvin     | kalady    | ernakulam | kl    | 680302      |
| 104     | alwin      | shaju      | manjapra  | ernakulam | kl    | 680302      |
| 105     | alfred     | george     | vendore   | thrissur  | kl    | 680302      |
+---------+------------+------------+-----------+-----------+-------+-------------+
5 rows in set (0.02 sec)
```

```
ERROR 1406 (22001): Data too long for column 'inst_phn' at row 1
mysql> insert into instructor values(1,'Asha','Boby',77655490,'asha@gmail.com');
Query OK, 1 row affected (0.01 sec)

mysql> insert into instructor values(1,'Ashna','Antony',34442334,'ashna@gmail.com');
ERROR 1062 (23000): Duplicate entry '1' for key 'instructor.PRIMARY'
mysql> insert into instructor values(2,'Ashna','Antony',34442334,'ashna@gmail.com');
Query OK, 1 row affected (0.01 sec)

mysql> insert into instructor values(3,'sandeep','manoj',70258585,'sandeep@gmail.com');
ERROR 1406 (22001): Data too long for column 'inst_mailid' at row 1
mysql> insert into instructor values(3,'sandeep','manoj',70258585,'sande@gmail.com');
Query OK, 1 row affected (0.01 sec)

mysql> insert into instructor values(4,'asifa','sabu',98278498,'asifa@gmail.com');
Query OK, 1 row affected (0.00 sec)

mysql> insert into instructor values(5,'george','binod',76438928,'george@gmail.com');
ERROR 1406 (22001): Data too long for column 'inst_mailid' at row 1
mysql> insert into instructor values(5,'george','binod',76438928,'geor@gmail.com');
Query OK, 1 row affected (0.01 sec)

mysql> select *from instructor;
+---------+------------+------------+----------+-----------------+
| inst_id | inst_fname | inst_lname | inst_phn | inst_mailid     |
+---------+------------+------------+----------+-----------------+
| 1       | Asha       | Boby       | 77655490 | asha@gmail.com  |
| 2       | Ashna      | Antony     | 34442334 | ashna@gmail.com |
| 3       | sandeep    | manoj      | 70258585 | sande@gmail.com |
| 4       | asifa      | sabu       | 98278498 | asifa@gmail.com |
| 5       | george     | binod      | 76438928 | geor@gmail.com  |
+---------+------------+------------+----------+-----------------+
5 rows in set (0.00 sec)
```

```
mysql> update instructor set salary=33000 where inst_id=3;
Query OK, 1 row affected (0.01 sec)
Rows matched: 1  Changed: 1  Warnings: 0

mysql> update instructor set salary=50000 where inst_id=4;
Query OK, 1 row affected (0.01 sec)
Rows matched: 1  Changed: 1  Warnings: 0

mysql> update instructor set salary=11000 where inst_id=5;
Query OK, 1 row affected (0.01 sec)
Rows matched: 1  Changed: 1  Warnings: 0

mysql> select * from instructor;
+---------+------------+------------+----------+-----------------+--------+
| inst_id | inst_fname | inst_lname | inst_phn | inst_mailid     | salary |
+---------+------------+------------+----------+-----------------+--------+
| 1       | Asha       | Boby       | 77655490 | asha@gmail.com  | 20000  |
| 2       | Ashna      | Antony     | 34442334 | ashna@gmail.com | 25000  |
| 3       | sandeep    | manoj      | 70258585 | sande@gmail.com | 33000  |
| 4       | asifa      | sabu       | 98278498 | asifa@gmail.com | 50000  |
| 5       | george     | binod      | 76438928 | geor@gmail.com  | 11000  |
+---------+------------+------------+----------+-----------------+--------+
5 rows in set (0.00 sec)
```

9. Add details of the first and second semester courses. Also add a new course for Data Mining with a course code of 201CA260 worth with credit of 4 hours.

```
mysql> insert into course values('20104','data structure',12);
Query OK, 1 row affected (0.01 sec)

mysql> insert into course values('20105','ob',10);
Query OK, 1 row affected (0.01 sec)

mysql> insert into course values('20106','adbms',10);
Query OK, 1 row affected (0.01 sec)

mysql> insert into course values('20107','acn',9);
Query OK, 1 row affected (0.01 sec)

mysql> insert into course values('20108','ai',8);
Query OK, 1 row affected (0.01 sec)

mysql> select * from course;
+-------------+---------------------+-------------+
| course_code | course_title        | course_hour |
+-------------+---------------------+-------------+
| 20101       | mfcs                |           8 |
| 20102       | digital             |          10 |
| 20103       | software engineering |          7 |
| 20104       | data structure      |          12 |
| 20105       | ob                  |          10 |
| 20106       | adbms               |          10 |
| 20107       | acn                 |           9 |
| 20108       | ai                  |           8 |
+-------------+---------------------+-------------+
8 rows in set (0.00 sec)
```

```
mysql> insert into course values('2060','datamining',4);
Query OK, 1 row affected (0.01 sec)

mysql> select * from course;
+-------------+---------------------+-------------+
| course_code | course_title        | course_hour |
+-------------+---------------------+-------------+
| 20101       | mfcs                |           8 |
| 20102       | digital             |          10 |
| 20103       | software engineering |          7 |
| 20104       | data structure      |          12 |
| 20105       | ob                  |          10 |
| 20106       | adbms               |          10 |
| 20107       | acn                 |           9 |
| 20108       | ai                  |           8 |
| 2060        | datamining          |           4 |
+-------------+---------------------+-------------+
9 rows in set (0.00 sec)
```

10. Add a new section for this new course with section ID as 301.The section should meet in
2-4 on MW in BLGNG102. The class size should be 35, and number enrolled should be 0. The
instructor should be 3, and the course is 20MCA260. Also add sections 302 and 303 for the
courses AOS and OB and enroll 5 students each to these courses.

```
mysql> insert into section1 values(302,5,'MW','BLGNG103',45,5,11114,'20105');
Query OK, 1 row affected (0.02 sec)

mysql> insert into section1 values(303,9,'MW','BLGNG104',40,5,11115,'20108');
Query OK, 1 row affected (0.01 sec)

mysql> select * from section1;
+------------+-------------+--------------+--------------+------------+-----------------+---------+-------------+
| section_id | time_offered | days_offered | section_room | class_size | number_enrolled | inst_id | course_code |
+------------+-------------+--------------+--------------+------------+-----------------+---------+-------------+
|        302 | 5           | MW           | BLGNG103     |         45 |               5 | 11114   | 20105       |
|        303 | 9           | MW           | BLGNG104     |         40 |               5 | 11115   | 20108       |
|       3011 | -2          | MW           | BLGNG102     |         35 |               0 | 11113   | 2060        |
+------------+-------------+--------------+--------------+------------+-----------------+---------+-------------+
3 rows in set (0.00 sec)
```

11. Register yourself along with your 3 friends for this new course by adding a row to the ENROLMENT table. The grade should be null 12.

```
mysql> insert into enrollment values(2,302,'');
Query OK, 1 row affected (0.01 sec)

mysql> insert into enrollment values(3,302,'');
Query OK, 1 row affected (0.01 sec)

mysql> insert into enrollment values(4,302,'');
Query OK, 1 row affected (0.01 sec)

mysql> select * from enrollment;
+---------+--------+-------+
| stud_no | sec_id | grade |
+---------+--------+-------+
| 1       | 301    |       |
| 2       | 302    |       |
| 3       | 302    |       |
| 4       | 302    |       |
+---------+--------+-------+
4 rows in set (0.00 sec)
```

12. Update the 301 section, and increase the class sizes by 10%.

```
mysql> update section1 set class_size=class_size+(class_size * 10/100) where section_id=3011;
Query OK, 1 row affected, 1 warning (0.01 sec)
Rows matched: 1  Changed: 1  Warnings: 1

mysql> select * from section1;
+------------+-------------+--------------+--------------+------------+-----------------+---------+-------------+
| section_id | time_offered | days_offered | section_room | class_size | number_enrolled | inst_id | course_code |
+------------+-------------+--------------+--------------+------------+-----------------+---------+-------------+
|        302 | 5           | MW           | BLGNG103     |         45 |               5 | 11114   | 20105       |
|        303 | 9           | MW           | BLGNG104     |         40 |               5 | 11115   | 20108       |
|       3011 | -2          | MW           | BLGNG102     |         39 |               0 | 11113   | 2060        |
+------------+-------------+--------------+--------------+------------+-----------------+---------+-------------+
3 rows in set (0.00 sec)
```

13. Give a 10% increment in salary for all instructors.

```
mysql> update instructor set salary=salary+(salary * 10/100);
Query OK, 5 rows affected (0.01 sec)
Rows matched: 5  Changed: 5  Warnings: 0

mysql> select * from instructor;
+---------+------------+------------+-----------+-----------------+--------+
| inst_id | inst_fname | inst_lname | inst_phn  | inst_mailid     | salary |
+---------+------------+------------+-----------+-----------------+--------+
| 1       | Asha       | Boby       | 77655490  | asha@gmail.com  | 22000  |
| 2       | Ashna      | Antony     | 34442334  | ashna@gmail.com | 27500  |
| 3       | sandeep    | manoj      | 70258585  | sande@gmail.com | 36300  |
| 4       | asifa      | sabu       | 98278498  | asifa@gmail.com | 55000  |
| 5       | george     | binod      | 76438928  | geor@gmail.com  | 12100  |
+---------+------------+------------+-----------+-----------------+--------+
5 rows in set (0.00 sec)
```

14. Delete Section 302 and verify for the rows in ENROLMENT table for that section.

```
mysql> delete from section1 where section_id=302;
Query OK, 1 row affected (0.01 sec)

mysql> select * from section1;
+------------+-------------+-------------+--------------+------------+-----------------+---------+-------------+
| section_id | time_offered | days_offered | section_room | class_size | number_enrolled | inst_id | course_code |
+------------+-------------+-------------+--------------+------------+-----------------+---------+-------------+
|        303 | 9           | MW          | BLGNG104     |         40 |               5 |   11115 | 20108       |
|       3011 | -2          | MW          | BLGNG102     |         39 |               0 |   11113 | 2060        |
+------------+-------------+-------------+--------------+------------+-----------------+---------+-------------+
2 rows in set (0.00 sec)

mysql>
```

TCL Commands:

15. Undo the previous delete operation.

```
mysql> rollback;
Query OK, 0 rows affected (0.00 sec)
```

16. Save all the transactions to the database.

```
mysql> commit;
Query OK, 0 rows affected (0.02 sec)
```

17. Grant the privilege to read and delete from the Enrolment table to the userU1.

```
mysql> create user 'U1' identified by '12345678';
Query OK, 0 rows affected (0.09 sec)

mysql> select user from mysql.user;
+------------------+
| user             |
+------------------+
| Senna Anto       |
| U1               |
| mysql.infoschema |
| mysql.session    |
| mysql.sys        |
| root             |
+------------------+
6 rows in set (0.00 sec)

mysql> grant select,update on enrollment to U1;
Query OK, 0 rows affected (0.03 sec)

mysql> show grants for 'U1';
+----------------------------------------------------------------+
| Grants for U1@%                                                |
+----------------------------------------------------------------+
| GRANT USAGE ON *.* TO `U1`@`%`                                 |
| GRANT SELECT, UPDATE ON `cyber_college`.`enrollment` TO `U1`@`%` |
+----------------------------------------------------------------+
2 rows in set (0.02 sec)
```

18. Revoke the delete privilege from U1.

```
mysql> revoke delete on enrollment from U1;
Query OK, 0 rows affected (0.01 sec)

mysql> show grants for 'U1';
+----------------------------------------------------------------+
| Grants for U1@%                                                |
+----------------------------------------------------------------+
| GRANT USAGE ON *.* TO `U1`@`%`                                 |
| GRANT SELECT, UPDATE ON `cyber_college`.`enrollment` TO `U1`@`%` |
+----------------------------------------------------------------+
2 rows in set (0.00 sec)
```

Accessing database (SELECT, Filtering using WHERE, HAVING, GROUP BY, ORDER BY Clauses, Subquery):

19. Display the full name and contact details of students living in Kochi.

```
mysql> select * from student;
+---------+------------+------------+-----------+-----------+-------+-------------+
| stud_no | stud_fname | stud_lname | address   | city      | state | postal_code |
+---------+------------+------------+-----------+-----------+-------+-------------+
| 101     | senna      | anto       | amballur  | thrissur  | kl    | 680302      |
| 102     | riya       | jose       | ernakulam | thrissur  | kl    | 680302      |
| 103     | anjali     | salvin     | kalady    | ernakulam | kl    | 680302      |
| 104     | alwin      | shaju      | manjapra  | ernakulam | kl    | 680302      |
| 105     | alfred     | george     | vendore   | thrissur  | kl    | 680302      |
| 106     | gokhul     | gopan      | vazhakal  | kochi     | kl    | 680332      |
+---------+------------+------------+-----------+-----------+-------+-------------+
6 rows in set (0.00 sec)

mysql> select stud_fname,stud_lname,address from student where city='kochi';
+------------+------------+----------+
| stud_fname | stud_lname | address  |
+------------+------------+----------+
| gokhul     | gopan      | vazhakal |
+------------+------------+----------+
1 row in set (0.00 sec)
```

20. List the student details who has longest first name.

```
mysql> select * from student where length(stud_fname)=(select max(length(stud_fname))from student));
ERROR 1064 (42000): You have an error in your SQL syntax; check the manual that corresponds to your MySQL server version for the rig
ht syntax to use near ')' at line 1
mysql> select * from student where length(stud_fname)=(select max(length(stud_fname))from student);
+---------+------------+------------+----------+-----------+-------+-------------+
| stud_no | stud_fname | stud_lname | address  | city      | state | postal_code |
+---------+------------+------------+----------+-----------+-------+-------------+
| 103     | anjali     | salvin     | kalady   | ernakulam | kl    | 680302      |
| 105     | alfred     | george     | vendore  | thrissur  | kl    | 680302      |
| 106     | gokhul     | gopan      | vazhakal | kochi     | kl    | 680332      |
+---------+------------+------------+----------+-----------+-------+-------------+
3 rows in set (0.01 sec)
```

21. Display the name and phone number of the instructors who is handling the courses AOS and ADBMS.

```
mysql> select Instructor_fname,Instructor_phone from Instructor i join Course c join Section s where i.Instructor_id=s
.Instructor_id and s.Course_Code=c.Course_Code and c.Course_Title='AOS' or 'ADBMS';
+------------------+------------------+
| Instructor_fname | Instructor_phone |
+------------------+------------------+
| Ashna            | 1423             |
+------------------+------------------+
1 row in set, 1 warning (0.05 sec)
```

22. List the codes, titles, and credit hours for courses worth 4 hours. Order the results in descending order of course code.

```
mysql> select course_code,course_title,course_hour from course where course_hour=4 order by course_code desc;
+-------------+--------------+-------------+
| course_code | course_title | course_hour |
+-------------+--------------+-------------+
| 2060        | datamining   | 4           |
+-------------+--------------+-------------+
1 row in set (0.00 sec)
```

23. Display the names of the students in the descending order along with their phone number.

```
MySQL 8.0 Command Line Client                                      —   □   ×

mysql> select stud_fname,stud_lname from student order by stud_fname desc
    -> ;
+------------+------------+
| stud_fname | stud_lname |
+------------+------------+
| senna      | anto       |
| riya       | jose       |
| gokhul     | gopan      |
| anjali     | salvin     |
| alwin      | shaju      |
| alfred     | george     |
+------------+------------+
6 rows in set (0.01 sec)

mysql>
```

24. List the Student"s name, course code and section id grouping the students by their grade.

```
mysql> select student.Stud_fname, Stud_lname, section.Course_code, enrolment.Section_id from student inner join section inne
r join enrolment on student.Stud_no=enrolment.Stud_no and section.Section_id=enrolment.Section_id group by enrolment.Grade;
+------------+------------+-------------+------------+
| Stud_fname | Stud_lname | Course_code | Section_id |
+------------+------------+-------------+------------+
| Jerry      | Mathew     | 20MCA6      | 301        |
+------------+------------+-------------+------------+
1 row in set (0.00 sec)
```

Optimizing databases (Join, Aggregate & Set operations, Other

operators like arithmetic, logical, special etc):

25. Use an inner join between the STUDENT and ENROLMENT tables for

showing the full name, Section id and Grade.

```
mysql> select student.Stud_fname, student.Stud_lname, enrolment.Section_id, enrolment.Grade from student inner join enrolmen
t on student.Stud_no=enrolment.Stud_no;
+------------+------------+------------+-------+
| Stud_fname | Stud_lname | Section_id | Grade |
+------------+------------+------------+-------+
| Jerry      | Mathew     | 301        |       |
| Unnimaya   | Unni       | 302        |       |
| Sreejith   | Vasudev    | 303        |       |
+------------+------------+------------+-------+
3 rows in set (0.00 sec)
```

26. Use an outer join between the STUDENT and ENROLMENT tables for showing the full name, Section id and Grade. Include all the students regardless of whether they have a matching section.

```
mysql> select student.stud_fname,student.stud_lname,enrollment.sec_id,enrollment.grade from student left join enrollment on student.
stud_no=enrollment.stud_no;
+------------+------------+--------+-------+
| stud_fname | stud_lname | sec_id | grade |
+------------+------------+--------+-------+
| senna      | anto       | NULL   | NULL  |
| riya       | jose       | NULL   | NULL  |
| anjali     | salvin     | NULL   | NULL  |
| alwin      | shaju      | NULL   | NULL  |
| alfred     | george     | NULL   | NULL  |
| gokhul     | gopan      | NULL   | NULL  |
+------------+------------+--------+-------+
6 rows in set (0.00 sec)
```

27. Give a 7% salary raise to instructors whose salary is less than the average.

```
mysql> update instructor set salary=salary+(salary*7/100)where salary < (select avg(salary));
Query OK, 0 rows affected (0.01 sec)
Rows matched: 0  Changed: 0  Warnings: 0

mysql> select * from instructor;
+---------+------------+------------+-----------+-----------------+--------+
| inst_id | inst_fname | inst_lname | inst_phn  | inst_mailid     | salary |
+---------+------------+------------+-----------+-----------------+--------+
| 1       | Asha       | Boby       | 77655490  | asha@gmail.com  | 22000  |
| 2       | Ashna      | Antony     | 34442334  | ashna@gmail.com | 27500  |
| 3       | sandeep    | manoj      | 70258585  | sande@gmail.com | 36300  |
| 4       | asifa      | sabu       | 98278498  | asifa@gmail.com | 55000  |
| 5       | george     | binod      | 76438928  | geor@gmail.com  | 12100  |
+---------+------------+------------+-----------+-----------------+--------+
5 rows in set (0.00 sec)
```

28. List full name and salary of instructors whose last name ends with „a" and earns highest salary.

```
mysql> select inst_fname,salary from instructor where salary=(select max(salary) from instructor) and inst_fname in(select inst_fname from instructor where inst_fname like '%a');
+------------+--------+
| inst_fname | salary |
+------------+--------+
| asifa      | 55000  |
+------------+--------+
1 row in set (0.01 sec)
```

29. Display the details of instructor who draws lowest salary.

```
mysql> select * from instructor where salary=(select min(salary) from instructor);
+---------+------------+------------+-----------+----------------+--------+
| inst_id | inst_fname | inst_lname | inst_phn  | inst_mailid    | salary |
+---------+------------+------------+-----------+----------------+--------+
| 5       | george     | binod      | 76438928  | geor@gmail.com | 12100  |
+---------+------------+------------+-----------+----------------+--------+
1 row in set (0.00 sec)
```

30. List the students details who lived in Kochi, Kerala or in Bangalore, Karnataka or both.

```
mysql> select * from student where city='kerala' and 'kochi' or 'banglore' and 'karnataka' or city in('kochi','kerala','banglore','karnataka');
+---------+------------+------------+----------+-------+-------+-------------+
| stud_no | stud_fname | stud_lname | address  | city  | state | postal_code |
+---------+------------+------------+----------+-------+-------+-------------+
| 106     | gokhul     | gopan      | vazhakal | kochi | kl    | 680332      |
+---------+------------+------------+----------+-------+-------+-------------+
1 row in set, 2 warnings (0.00 sec)
```