

FEDERAL INSTITUTE OF SCIENCE AND TECHNOLOGY (FISAT)
DEPARTMENT OF COMPUTER APPLICATIONS

ADVANCED DBMS LAB

(Semester & Batch: S2 MCA 2020 B Batch)

CYCLE -1

CO 1	Design and build a simple relational database system and demonstrate competence with the fundamentals tasks involved with modelling, designing and implementing a database.
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CYBER COLLEGE DATABASE:

1. Table Name: STUDENT

COLUMN NAME	DATATYPE(LENGTH)	CONSTRAINTS
Stud_No	VARCHAR(9)	PRIMARY KEY
Stud_lname	VARCHAR(30)	
Stud_fname	VARCHAR(20)	
Stud_address	VARCHAR(50)	
Stud_City	VARCHAR(30)	
State	VARCHAR(2)	
PostalCode	VARCHAR(9)	

2) Table Name: INSTRUCTOR

COLUMN NAME	DATATYPE(LENGTH)	CONSTRAINTS
Instructor_id	VARCHAR(5)	PRIMARY KEY
Instructor_lname	VARCHAR(30)	
Instructor_fname	VARCHAR(20)	
Instructor_phone	VARCHAR(8)	

3) Table Name: COURSE

COLUMN NAME	DATATYPE(LENGTH)	CONSTRAINTS
Course_Code	VARCHAR(6)	PRIMARY KEY
Course_Title	VARCHAR(25)	
Course_Hours	NUMBER(2,0)	
Semester	VARCHAR(20)	

4) Table Name: SECTION

COLUMN NAME	DATATYPE(LENGTH)	CONSTRAINTS
Section_id	NUMBER	PRIMARY KEY
Time_Offered	VARCHAR(10)	
Days_Offered	VARCHAR(10)	
Section_Room	VARCHAR(8)	
Class_Size	NUMBER(3,0)	CHECK >=0
Number_Enrolled	NUMBER(3,0)	CHECK >=0
Instructor_id	VARCHAR(5)	FOREIGN KEY
Course_Code	VARCHAR(6)	FOREIGN KEY

5) Table Name: ENROLMENT

COLUMN NAME	DATATYPE(LENGTH)	CONSTRIANTS
Stud_No	VARCHAR(9)	PRIMARY KEY, FOREIGN KEY
Section_id	VARCHAR(7)	PRIMARY KEY, FOREIGN KEY
Grade	VARCHAR(2)	

I. 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 CYBERCOLLEGE;
Query OK, 1 row affected (0.01 sec)

mysql> USE CYBERCOLLEGE;
Database changed
mysql> CREATE TABLE STUDENT(Stud_No VARCHAR(9) PRIMARY KEY,Stud_lname VARCHAR(30),Stud_fname VARCHAR(20),Stud_address VARCHAR(50),Stud_City VARCHAR(30),State VARCHAR(2),Postalcode VARCHAR(9));
Query OK, 0 rows affected (0.04 sec)

mysql> desc STUDENT;
+-----+-----+-----+-----+-----+-----+
| Field | Type | Null | Key | Default | Extra |
+-----+-----+-----+-----+-----+-----+
| Stud_No | varchar(9) | NO | PRI | NULL | |
| Stud_lname | varchar(30) | YES | | NULL | |
| Stud_fname | varchar(20) | YES | | NULL | |
| Stud_address | varchar(50) | YES | | NULL | |
| Stud_City | varchar(30) | YES | | NULL | |
| State | varchar(2) | YES | | NULL | |
| Postalcode | varchar(9) | YES | | NULL | |
+-----+-----+-----+-----+-----+-----+
7 rows in set (0.06 sec)

mysql> CREATE TABLE INSTRUCTOR(Instructor_id VARCHAR(5) PRIMARY KEY,Instructor_lname VARCHAR(30),Instructor_fname VARCHAR(20),Instructor_phone VARCHAR(8));
Query OK, 0 rows affected (0.03 sec)

mysql> desc INSTRUCTOR;
+-----+-----+-----+-----+-----+-----+
| Field | Type | Null | Key | Default | Extra |
+-----+-----+-----+-----+-----+-----+
| Instructor_id | varchar(5) | NO | PRI | NULL | |
| Instructor_lname | varchar(30) | YES | | NULL | |
| Instructor_fname | varchar(20) | YES | | NULL | |
| Instructor_phone | varchar(8) | YES | | NULL | |
+-----+-----+-----+-----+-----+-----+
4 rows in set (0.06 sec)
```

```
mysql> CREATE TABLE COURSE(Course_Code VARCHAR(6) PRIMARY KEY,Course_Title VARCHAR(25),Course_Hours NUMERIC(2,0),Semester VARCHAR(20));
Query OK, 0 rows affected (0.08 sec)

mysql> desc COURSE;
+-----+-----+-----+-----+-----+-----+
| Field | Type | Null | Key | Default | Extra |
+-----+-----+-----+-----+-----+-----+
| Course_Code | varchar(6) | NO | PRI | NULL | |
| Course_Title | varchar(25) | YES | | NULL | |
| Course_Hours | decimal(2,0) | YES | | NULL | |
| Semester | varchar(20) | YES | | NULL | |
+-----+-----+-----+-----+-----+-----+
4 rows in set (0.06 sec)

mysql> CREATE TABLE SECTION(Section_id NUMERIC PRIMARY KEY,Time_Offered VARCHAR(10),Days_Offered VARCHAR(10),Section_Room VARCHAR(8),Class_Size NUMERIC(3,0) CHECK (Class_Size>=0), Number_Enrolled NUMERIC(3,0) CHECK (Number_Enrolled>=0),Instructor_id VARCHAR(5) REFERENCES INSTRUCTOR(Instructor_id),Course_Code VARCHAR(6) REFERENCES COURSE(Course_Code));
Query OK, 0 rows affected (0.03 sec)

mysql> desc SECTION;
+-----+-----+-----+-----+-----+-----+
| Field | Type | Null | Key | Default | Extra |
+-----+-----+-----+-----+-----+-----+
| Section_id | decimal(10,0) | NO | PRI | NULL | |
| Time_Offered | varchar(10) | YES | | NULL | |
| Days_Offered | varchar(10) | YES | | NULL | |
| Section_Room | varchar(8) | YES | | NULL | |
| Class_Size | decimal(3,0) | YES | | NULL | |
| Number_Enrolled | decimal(3,0) | YES | | NULL | |
| Instructor_id | varchar(5) | YES | | NULL | |
| Course_Code | varchar(6) | YES | | NULL | |
+-----+-----+-----+-----+-----+-----+
8 rows in set (0.02 sec)

mysql> CREATE TABLE ENROLLMENT(Stud_No VARCHAR(9) REFERENCES STUDENT(Stud_No),Section_id VARCHAR(7) REFERENCES SECTION(Section_id),Grade VARCHAR(2));
Query OK, 0 rows affected (0.03 sec)

mysql> desc ENROLLMENT;
+-----+-----+-----+-----+-----+-----+
| Field | Type | Null | Key | Default | Extra |
+-----+-----+-----+-----+-----+-----+
| Stud_No | varchar(9) | YES | | NULL | |
| Section_id | varchar(7) | YES | | NULL | |
| Grade | varchar(2) | YES | | NULL | |
+-----+-----+-----+-----+-----+-----+
3 rows in set (0.01 sec)
```

2. Add a field Country to the STUDENT table with the default value set to 'India'.

```
mysql> desc STUDENT;
+-----+-----+-----+-----+-----+-----+
| Field | Type | Null | Key | Default | Extra |
+-----+-----+-----+-----+-----+-----+
| Stud_No | varchar(9) | NO | PRI | NULL | |
| Stud_lname | varchar(30) | YES | | NULL | |
| Stud_fname | varchar(20) | YES | | NULL | |
| Stud_address | varchar(50) | YES | | NULL | |
| Stud_City | varchar(30) | YES | | NULL | |
| State | varchar(2) | YES | | NULL | |
| Postalcode | varchar(9) | YES | | NULL | |
+-----+-----+-----+-----+-----+-----+
7 rows in set (0.00 sec)

mysql> ALTER TABLE STUDENT ADD Country VARCHAR(20) DEFAULT 'India';
Query OK, 0 rows affected (0.08 sec)
Records: 0 Duplicates: 0 Warnings: 0

mysql> desc STUDENT;
+-----+-----+-----+-----+-----+-----+
| Field | Type | Null | Key | Default | Extra |
+-----+-----+-----+-----+-----+-----+
| Stud_No | varchar(9) | NO | PRI | NULL | |
| Stud_lname | varchar(30) | YES | | NULL | |
| Stud_fname | varchar(20) | YES | | NULL | |
| Stud_address | varchar(50) | YES | | NULL | |
| Stud_City | varchar(30) | YES | | NULL | |
| State | varchar(2) | YES | | NULL | |
| Postalcode | varchar(9) | YES | | NULL | |
| Country | varchar(20) | YES | | India | |
+-----+-----+-----+-----+-----+-----+
8 rows in set (0.05 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 IN('A','B','C','D'));
Query OK, 0 rows affected (0.57 sec)
Records: 0 Duplicates: 0 Warnings: 0

mysql>
```

4. Modify the ENROLLMENT table by changing the width of the field Grade to 1

```
mysql> desc ENROLLMENT;
+-----+-----+-----+-----+-----+-----+
| Field      | Type      | Null | Key | Default | Extra |
+-----+-----+-----+-----+-----+-----+
| Stud_No    | varchar(9) | YES  |     | NULL    |       |
| Section_id | varchar(7) | YES  |     | NULL    |       |
| Grade      | varchar(2) | YES  |     | NULL    |       |
+-----+-----+-----+-----+-----+-----+
3 rows in set (0.05 sec)

mysql> ALTER TABLE ENROLLMENT MODIFY Grade VARCHAR(1);
Query OK, 0 rows affected (0.14 sec)
Records: 0 Duplicates: 0 Warnings: 0

mysql> desc ENROLLMENT;
+-----+-----+-----+-----+-----+-----+
| Field      | Type      | Null | Key | Default | Extra |
+-----+-----+-----+-----+-----+-----+
| Stud_No    | varchar(9) | YES  |     | NULL    |       |
| Section_id | varchar(7) | YES  |     | NULL    |       |
| Grade      | varchar(1) | YES  |     | NULL    |       |
+-----+-----+-----+-----+-----+-----+
3 rows in set (0.00 sec)
```

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

```
mysql> desc INSTRUCTOR;
+-----+-----+-----+-----+-----+-----+
| Field          | Type      | Null | Key | Default | Extra |
+-----+-----+-----+-----+-----+-----+
| Instructor_id  | varchar(5) | NO   | PRI | NULL    |       |
| Instructor_lname | varchar(30) | YES  |     | NULL    |       |
| Instructor_fname | varchar(20) | YES  |     | NULL    |       |
| Instructor_phone | varchar(8) | YES  |     | NULL    |       |
+-----+-----+-----+-----+-----+-----+
4 rows in set (0.00 sec)

mysql> ALTER TABLE INSTRUCTOR ADD Salary VARCHAR(10);
Query OK, 0 rows affected (0.07 sec)
Records: 0 Duplicates: 0 Warnings: 0

mysql> desc INSTRUCTOR;
+-----+-----+-----+-----+-----+-----+
| Field          | Type      | Null | Key | Default | Extra |
+-----+-----+-----+-----+-----+-----+
| Instructor_id  | varchar(5) | NO   | PRI | NULL    |       |
| Instructor_lname | varchar(30) | YES  |     | NULL    |       |
| Instructor_fname | varchar(20) | YES  |     | NULL    |       |
| Instructor_phone | varchar(8) | YES  |     | NULL    |       |
| Salary         | varchar(10) | YES  |     | NULL    |       |
+-----+-----+-----+-----+-----+-----+
5 rows in set (0.06 sec)
```

6. Drop the column Country from the STUDENT table.

```
mysql> desc STUDENT;
+-----+-----+-----+-----+-----+-----+
| Field      | Type      | Null | Key | Default | Extra |
+-----+-----+-----+-----+-----+-----+
| Stud_No    | varchar(9) | NO   | PRI | NULL    |       |
| Stud_lname | varchar(30)| YES  |     | NULL    |       |
| Stud_fname | varchar(20)| YES  |     | NULL    |       |
| Stud_address | varchar(50)| YES  |     | NULL    |       |
| Stud_City  | varchar(30)| YES  |     | NULL    |       |
| State      | varchar(2) | YES  |     | NULL    |       |
| Postalcode | varchar(9) | YES  |     | NULL    |       |
| Country    | varchar(20)| YES  |     | India   |       |
+-----+-----+-----+-----+-----+-----+
8 rows in set (0.00 sec)

mysql> ALTER TABLE STUDENT DROP Country;
Query OK, 0 rows affected (0.13 sec)
Records: 0 Duplicates: 0 Warnings: 0

mysql> desc STUDENT;
+-----+-----+-----+-----+-----+-----+
| Field      | Type      | Null | Key | Default | Extra |
+-----+-----+-----+-----+-----+-----+
| Stud_No    | varchar(9) | NO   | PRI | NULL    |       |
| Stud_lname | varchar(30)| YES  |     | NULL    |       |
| Stud_fname | varchar(20)| YES  |     | NULL    |       |
| Stud_address | varchar(50)| YES  |     | NULL    |       |
| Stud_City  | varchar(30)| YES  |     | NULL    |       |
| State      | varchar(2) | YES  |     | NULL    |       |
| Postalcode | varchar(9) | YES  |     | NULL    |       |
+-----+-----+-----+-----+-----+-----+
7 rows in set (0.06 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.Instructor_id,i.Instructor_lname,i.Instructor_phone,c.Course_Title from INSTRUCTOR i join COURSE c join SECTION s where i.Instructor_id=s.Instructor_id and s.Course_Code=c.Course_Code;
Query OK, 0 rows affected (0.02 sec)

mysql> select * from INST;
+-----+-----+-----+-----+
| Instructor_id | Instructor_lname | Instructor_phone | Course_Title |
+-----+-----+-----+-----+
| 202          | Ashna           | 999999991       | AI           |
| 201          | Asha            | 999999990       | ADBMS        |
+-----+-----+-----+-----+
2 rows in set (0.01 sec)
```

II. DML Commands:

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,'Miranta','Johny','ABC','KLM','K',686691);
Query OK, 1 row affected (0.06 sec)

mysql> INSERT INTO STUDENT VALUES(102,'Kavya','Boban','DEF','ANGAMALY','K',683572);
Query OK, 1 row affected (0.05 sec)

mysql> INSERT INTO STUDENT VALUES(103,'Nimisha','MM','GHI','ANGAMALY','K',683572);
Query OK, 1 row affected (0.05 sec)

mysql> INSERT INTO STUDENT VALUES(104,'Anagha','Chacko','JKL','KLM','K',686691);
Query OK, 1 row affected (0.05 sec)

mysql> INSERT INTO STUDENT VALUES(105,'Irin','Ali','MNO','MUVATTUPUZHA','K',686661);
Query OK, 1 row affected (0.05 sec)

mysql> INSERT INTO STUDENT VALUES(106,'Bhavya','Manoj','PQR','MUVATTUPUZHA','K',686661);
Query OK, 1 row affected (0.05 sec)

mysql> select * from STUDENT;
```

Stud_No	Stud_lname	Stud_fname	Stud_address	Stud_City	State	Postalcode
101	Miranta	Johny	ABC	KLM	K	686691
102	Kavya	Boban	DEF	ANGAMALY	K	683572
103	Nimisha	MM	GHI	ANGAMALY	K	683572
104	Anagha	Chacko	JKL	KLM	K	686691
105	Irin	Ali	MNO	MUVATTUPUZHA	K	686661
106	Bhavya	Manoj	PQR	MUVATTUPUZHA	K	686661

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

```
mysql> desc INSTRUCTOR;
```

Field	Type	Null	Key	Default	Extra
Instructor_id	varchar(5)	NO	PRI	NULL	
Instructor_lname	varchar(30)	YES		NULL	
Instructor_fname	varchar(20)	YES		NULL	
Instructor_phone	varchar(8)	YES		NULL	
Salary	varchar(10)	YES		NULL	

```
5 rows in set (0.06 sec)

mysql> INSERT INTO INSTRUCTOR VALUES(201,'Asha','','99999990,20000);
Query OK, 1 row affected (0.05 sec)

mysql> INSERT INTO INSTRUCTOR VALUES(202,'Ashna','','99999991,20500);
Query OK, 1 row affected (0.05 sec)

mysql> INSERT INTO INSTRUCTOR VALUES(203,'Sandeep','','99999992,30000);
Query OK, 1 row affected (0.05 sec)

mysql> INSERT INTO INSTRUCTOR VALUES(204,'Asifa','','99999993,40000);
Query OK, 1 row affected (0.05 sec)

mysql> INSERT INTO INSTRUCTOR VALUES(205,'George','','99999994,10000);
Query OK, 1 row affected (0.05 sec)

mysql> select * from INSTRUCTOR;
```

Instructor_id	Instructor_lname	Instructor_fname	Instructor_phone	Salary
201	Asha		99999990	20000
202	Ashna		99999991	20500
203	Sandeep		99999992	30000
204	Asifa		99999993	40000
205	George		99999994	10000

```
5 rows in set (0.05 sec)
```

9. Add details of the first and second semester courses. Also add a new course for Data Mining with a course code of 20MCA260 worth with credit of 4 hours

```
mysql> INSERT INTO COURSE VALUES('20MCA101','MFCS',4,1);
Query OK, 1 row affected (0.05 sec)

mysql> INSERT INTO COURSE VALUES('20MCA102','DIGITAL',3,1);
Query OK, 1 row affected (0.05 sec)

mysql> INSERT INTO COURSE VALUES('20MCA103','ADS',3,1);
Query OK, 1 row affected (0.05 sec)

mysql> INSERT INTO COURSE VALUES('20MCA104','ASE',5,1);
Query OK, 1 row affected (0.05 sec)

mysql> INSERT INTO COURSE VALUES('20MCA201','ADBMS',4,2);
Query OK, 1 row affected (0.02 sec)

mysql> INSERT INTO COURSE VALUES('20MCA202','ACN',4,2);
Query OK, 1 row affected (0.05 sec)

mysql> INSERT INTO COURSE VALUES('20MCA203','OB',2,2);
Query OK, 1 row affected (0.05 sec)

mysql> INSERT INTO COURSE VALUES('20MCA204','AI',2,2);
Query OK, 1 row affected (0.05 sec)

mysql> INSERT INTO COURSE VALUES('20MCA260','DATA MINING',4,2);
Query OK, 1 row affected (0.05 sec)

mysql> select * from COURSE;
```

Course_Code	Course_Title	Course_Hours	Semester
20MCA101	MFCS	4	1
20MCA102	DIGITAL	3	1
20MCA103	ADS	3	1
20MCA104	ASE	5	1
20MCA201	ADBMS	4	2
20MCA202	ACN	4	2
20MCA203	OB	2	2
20MCA204	AI	2	2
20MCA260	DATA MINING	4	2

```
9 rows in set (0.05 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 enrol 5 students each to these courses

```
mysql> desc SECTION;
+-----+-----+-----+-----+-----+-----+
| Field | Type | Null | Key | Default | Extra |
+-----+-----+-----+-----+-----+-----+
| Section_id | decimal(10,0) | NO | PRI | NULL | |
| Time_Offered | varchar(10) | YES | | NULL | |
| Days_Offered | varchar(10) | YES | | NULL | |
| Section_Room | varchar(8) | YES | | NULL | |
| Class_Size | decimal(3,0) | YES | | NULL | |
| Number_Enrolled | decimal(3,0) | YES | | NULL | |
| Instructor_id | varchar(5) | YES | | NULL | |
| Course_Code | varchar(8) | YES | | NULL | |
+-----+-----+-----+-----+-----+-----+
3 rows in set (0.04 sec)

mysql> INSERT INTO SECTION VALUES(301,2-4,'MW','BLGNG102',35,0,3,'20MCA260');
Query OK, 1 row affected (0.05 sec)

mysql> INSERT INTO SECTION VALUES(302,2,'MW','BLGNG102',35,5,201,'20MCA203');
Query OK, 1 row affected (0.05 sec)

mysql> INSERT INTO SECTION VALUES(303,2,'MW','BLGNG102',35,5,202,'20MCA204');
Query OK, 1 row affected (0.05 sec)

mysql> select * from SECTION;
+-----+-----+-----+-----+-----+-----+-----+
| Section_id | Time_Offered | Days_Offered | Section_Room | Class_Size | Number_Enrolled | Instructor_id | Course_Code |
+-----+-----+-----+-----+-----+-----+-----+
| 301 | 2-4 | MW | BLGNG102 | 35 | 0 | 3 | 20MCA260 |
| 302 | 2 | MW | BLGNG102 | 35 | 5 | 201 | 20MCA203 |
| 303 | 2 | MW | BLGNG102 | 35 | 5 | 202 | 20MCA204 |
+-----+-----+-----+-----+-----+-----+-----+
3 rows in set (0.00 sec)

mysql> UPDATE SECTION set Time_Offered=2.4 where Section_id=301;
Query OK, 1 row affected (0.05 sec)
Rows matched: 1 Changed: 1 Warnings: 0

mysql> select * from SECTION;
+-----+-----+-----+-----+-----+-----+-----+
| Section_id | Time_Offered | Days_Offered | Section_Room | Class_Size | Number_Enrolled | Instructor_id | Course_Code |
+-----+-----+-----+-----+-----+-----+-----+
| 301 | 2.4 | MW | BLGNG102 | 35 | 0 | 3 | 20MCA260 |
| 302 | 2 | MW | BLGNG102 | 35 | 5 | 201 | 20MCA203 |
| 303 | 2 | MW | BLGNG102 | 35 | 5 | 202 | 20MCA204 |
+-----+-----+-----+-----+-----+-----+-----+
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 ENROLLMENT table. The grade should be null.

```
mysql> INSERT INTO ENROLLMENT VALUES(101,301,'');
Query OK, 1 row affected (0.05 sec)

mysql> INSERT INTO ENROLLMENT VALUES(102,302,'');
Query OK, 1 row affected (0.05 sec)

mysql> INSERT INTO ENROLLMENT VALUES(103,303,'');
Query OK, 1 row affected (0.05 sec)

mysql> select * from ENROLLMENT;
+-----+-----+-----+
| Stud_No | Section_id | Grade |
+-----+-----+-----+
| 101 | 301 | |
| 102 | 302 | |
| 103 | 303 | |
+-----+-----+-----+
3 rows in set (0.00 sec)
```


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

```
mysql> select * from SECTION;
```

Section_id	Time_Offered	Days_Offered	Section_Room	Class_Size	Number_Enrolled	Instructor_id	Course_Code
301	2.4	MM	BLGNG102	35	0	3	20MCA260
302	2	MM	BLGNG102	35	5	201	20MCA203
303	2	MM	BLGNG102	35	5	202	20MCA204

3 rows in set (0.00 sec)

```
mysql> UPDATE SECTION set Class_Size=Class_Size+(Class_Size*10/100) where Section_id=301;
Query OK, 1 row affected, 1 warning (0.05 sec)
Rows matched: 1 Changed: 1 Warnings: 1
```

```
mysql> select * from SECTION;
```

Section_id	Time_Offered	Days_Offered	Section_Room	Class_Size	Number_Enrolled	Instructor_id	Course_Code
301	2.4	MM	BLGNG102	39	0	3	20MCA260
302	2	MM	BLGNG102	35	5	201	20MCA203
303	2	MM	BLGNG102	35	5	202	20MCA204

3 rows in set (0.00 sec)

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

```
mysql> select * from INSTRUCTOR;
```

Instructor_id	Instructor_lname	Instructor_fname	Instructor_phone	Salary
201	Asha		99999990	20000
202	Ashna		99999991	20500
203	Sandeep		99999992	30000
204	Asifa		99999993	40000
205	George		99999994	10000

5 rows in set (0.05 sec)

```
mysql> UPDATE INSTRUCTOR set Salary=Salary+(Salary*10/100);
Query OK, 5 rows affected (0.05 sec)
Rows matched: 5 Changed: 5 Warnings: 0
```

```
mysql> select * from INSTRUCTOR;
```

Instructor_id	Instructor_lname	Instructor_fname	Instructor_phone	Salary
201	Asha		99999990	22000
202	Ashna		99999991	22550
203	Sandeep		99999992	33000
204	Asifa		99999993	44000
205	George		99999994	11000

5 rows in set (0.00 sec)

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

```
mysql> select * from SECTION;
```

Section_id	Time_Offered	Days_Offered	Section_Room	Class_Size	Number_Enrolled	Instructor_id	Course_Code
301	2.4	MM	BLGNG102	39	0	3	20MCA260
302	2	MM	BLGNG102	35	5	201	20MCA203
303	2	MM	BLGNG102	35	5	202	20MCA204

3 rows in set (0.00 sec)

```
mysql> DELETE FROM SECTION where Section_id=302;
Query OK, 1 row affected (0.05 sec)
```

```
mysql> select * from SECTION;
```

Section_id	Time_Offered	Days_Offered	Section_Room	Class_Size	Number_Enrolled	Instructor_id	Course_Code
301	2.4	MM	BLGNG102	39	0	3	20MCA260
303	2	MM	BLGNG102	35	5	202	20MCA204

2 rows in set (0.00 sec)

III. TCL Commands:

15. Undo the previous delete operation

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

16. Save all the transactions to the database.

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

17. Grant the privilege to read and delete from the ENROLMENT table to the User U1.

```
mysql> create user 'U1' identified by '1234';  
Query OK, 0 rows affected (0.00 sec)  
  
mysql> select user from mysql.user;  
+-----+  
| user |  
+-----+  
| U1   |  
| mysql.infoschema |  
| mysql.session   |  
| mysql.sys       |  
| root            |  
+-----+  
5 rows in set (0.00 sec)  
  
mysql> grant select,update on ENROLLMENT to U1;  
Query OK, 0 rows affected (0.00 sec)  
  
mysql> show grants for 'U1';  
+-----+  
| Grants for U1@% |  
+-----+  
| GRANT USAGE ON *.* TO 'U1'@'%' |  
| GRANT SELECT, UPDATE ON 'cybercollege'.enrollment TO 'U1'@'%' |  
+-----+  
2 rows in set (0.05 sec)
```

18. Revoke the delete privilege from U1

```
mysql> revoke update on ENROLLMENT from U1;  
Query OK, 0 rows affected (0.05 sec)  
  
mysql> show grants for 'U1';  
+-----+  
| Grants for U1@% |  
+-----+  
| GRANT USAGE ON *.* TO 'U1'@'%' |  
| GRANT SELECT ON 'cybercollege'.enrollment TO 'U1'@'%' |  
+-----+  
2 rows in set (0.00 sec)
```

IV. 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> INSERT INTO STUDENT VALUES(107,'Liya','Jaison','STU','KOCHI','K',683677);
Query OK, 1 row affected (0.05 sec)

mysql> select * from STUDENT;
+----+-----+-----+-----+-----+-----+-----+
| Stud_No | Stud_lname | Stud_fname | Stud_address | Stud_City | State | Postalcode |
+----+-----+-----+-----+-----+-----+-----+
| 101 | Miranta | Johny | ABC | KLM | K | 686691 |
| 102 | Kavya | Boban | DEF | ANGAVALY | K | 683572 |
| 103 | Nimisha | PV | GHI | ANGAVALY | K | 683572 |
| 104 | Anagha | Chacko | JKL | KLM | K | 686691 |
| 105 | Irin | Ali | MNO | MUVATTUPUZHA | K | 686661 |
| 106 | Bhavya | Manoj | PQR | MUVATTUPUZHA | K | 686661 |
| 107 | Liya | Jaison | STU | KOCHI | K | 683677 |
+----+-----+-----+-----+-----+-----+-----+
7 rows in set (0.00 sec)

mysql> SELECT Stud_lname,Stud_fname,Stud_address from STUDENT WHERE Stud_City='KOCHI';
+-----+-----+-----+
| Stud_lname | Stud_fname | Stud_address |
+-----+-----+-----+
| Liya | Jaison | STU |
+-----+-----+-----+
1 row in set (0.00 sec)

mysql>
```

20. List the student details who has longest first name

```
mysql> select * from STUDENT;
+----+-----+-----+-----+-----+-----+-----+
| Stud_No | Stud_lname | Stud_fname | Stud_address | Stud_City | State | Postalcode |
+----+-----+-----+-----+-----+-----+-----+
| 101 | Miranta | Johny | ABC | KLM | K | 686691 |
| 102 | Kavya | Boban | DEF | ANGAVALY | K | 683572 |
| 103 | Nimisha | PV | GHI | ANGAVALY | K | 683572 |
| 104 | Anagha | Chacko | JKL | KLM | K | 686691 |
| 105 | Irin | Ali | MNO | MUVATTUPUZHA | K | 686661 |
| 106 | Bhavya | Manoj | PQR | MUVATTUPUZHA | K | 686661 |
| 107 | Liya | Jaison | STU | KOCHI | K | 683677 |
+----+-----+-----+-----+-----+-----+-----+
7 rows in set (0.00 sec)

mysql> SELECT * FROM STUDENT WHERE length(Stud_fname)=(select max(length(Stud_fname))from STUDENT);
+----+-----+-----+-----+-----+-----+-----+
| Stud_No | Stud_lname | Stud_fname | Stud_address | Stud_City | State | Postalcode |
+----+-----+-----+-----+-----+-----+-----+
| 104 | Anagha | Chacko | JKL | KLM | K | 686691 |
| 107 | Liya | Jaison | STU | KOCHI | K | 683677 |
+----+-----+-----+-----+-----+-----+-----+
2 rows in set (0.00 sec)
```

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

```
mysql> select * from INSTRUCTOR;
+-----+-----+-----+-----+-----+
| Instructor_id | Instructor_lname | Instructor_fname | Instructor_phone | Salary |
+-----+-----+-----+-----+-----+
| 201 | Asha | | 99999990 | 22000 |
| 202 | Asha | | 99999991 | 22500 |
| 203 | Sandeep | | 99999992 | 33000 |
| 204 | Asifa | | 99999993 | 44000 |
| 205 | George | | 99999994 | 11000 |
+-----+-----+-----+-----+-----+
5 rows in set (0.00 sec)

mysql> select * from COURSE;
+-----+-----+-----+-----+
| Course_Code | Course_Title | Course_Hours | Semester |
+-----+-----+-----+-----+
| 20MKA101 | MFCS | 4 | 1 |
| 20MKA102 | DIGITAL | 3 | 1 |
| 20MKA103 | ADS | 3 | 1 |
| 20MKA104 | ASE | 5 | 1 |
| 20MKA201 | ADPMS | 4 | 2 |
| 20MKA202 | ACN | 4 | 2 |
| 20MKA203 | OB | 2 | 2 |
| 20MKA204 | AI | 2 | 2 |
| 20MKA200 | DATA MINING | 4 | 2 |
+-----+-----+-----+-----+
9 rows in set (0.00 sec)

mysql> select * from SECTION;
+-----+-----+-----+-----+-----+-----+-----+
| Section_id | Time_Offered | Days_Offered | Section_Room | Class_Size | Number_Enrolled | Instructor_id | Course_Code |
+-----+-----+-----+-----+-----+-----+-----+
| 301 | 2:4 | PM | BLDG102 | 30 | 0 | 3 | 20MKA200 |
| 303 | 2 | PM | BLDG102 | 35 | 5 | 202 | 20MKA204 |
| 304 | 2 | PM | BLDG102 | 35 | 5 | 201 | 20MKA201 |
+-----+-----+-----+-----+-----+-----+-----+
3 rows in set (0.00 sec)

mysql> select Instructor_lname,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='ADPM S' or 'AOS';
+-----+-----+
| Instructor_lname | Instructor_phone |
+-----+-----+
| Asha | 99999990 |
+-----+-----+
1 row in set, 1 warning (0.00 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 * from COURSE;
```

Course_Code	Course_Title	Course_Hours	Semester
20MCA101	MFCS	4	1
20MCA102	DIGITAL	3	1
20MCA103	ADS	3	1
20MCA104	ASE	5	1
20MCA201	ADBMS	4	2
20MCA202	ACN	4	2
20MCA203	OB	2	2
20MCA204	AI	2	2
20MCA200	DATA MINING	4	2

```
0 rows in set (0.00 sec)

mysql> select Course_Code,Course_Title,Course_Hours from Course where Course_Hours=4 order by Course_Code desc;
```

Course_Code	Course_Title	Course_Hours
20MCA200	DATA MINING	4
20MCA202	ACN	4
20MCA201	ADBMS	4
20MCA101	MFCS	4

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

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

```
mysql> select * from STUDENT;
```

Stud_No	Stud_Iname	Stud_fname	Stud_address	Stud_City	State	Postalcode
101	Miranta	Johny	ABC	KLM	K	686691
102	Kavya	Boban	DEF	ANGAMALY	K	683572
103	Nimisha	HH	GHI	ANGAMALY	K	683572
104	Anagha	Chacko	JKL	KLM	K	686691
105	Irin	Ali	MNO	MUVATTUPUZHA	K	686661
106	Bhavya	Manoj	PQR	MUVATTUPUZHA	K	686661
107	Liya	Jaison	STU	KOCHI	K	683677

```
7 rows in set (0.00 sec)

mysql> SELECT Stud_Iname,Stud_fname from STUDENT order by Stud_Iname desc;
```

Stud_Iname	Stud_fname
Nimisha	HH
Miranta	Johny
Liya	Jaison
Kavya	Boban
Irin	Ali
Bhavya	Manoj
Anagha	Chacko

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

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

```
mysql> select * from STUDENT;
```

Stud_No	Stud_Iname	Stud_fname	Stud_address	Stud_City	State	Postalcode
101	Miranta	Johny	ABC	KLM	K	686691
102	Kavya	Boban	DEF	ANGAMALY	K	683572
103	Nimisha	HH	GHI	ANGAMALY	K	683572
104	Anagha	Chacko	JKL	KLM	K	686691
105	Irin	Ali	MNO	MUVATTUPUZHA	K	686661
106	Bhavya	Manoj	PQR	MUVATTUPUZHA	K	686661
107	Liya	Jaison	STU	KOCHI	K	683677

```
7 rows in set (0.00 sec)

mysql> select * from SECTION;
```

Section_Id	Time_Offered	Days_Offered	Section_Room	Class_Size	Number_Enrolled	Instructor_Id	Course_Code
301	2:4	FW	BLGNG102	39	0	3	20MCA200
303	2	FW	BLGNG102	35	5	202	20MCA204
304	2	FW	BLGNG102	35	5	201	20MCA201

```
3 rows in set (0.00 sec)

mysql> select * from ENROLLMENT;
```

Stud_No	Section_Id	Grade
101	301	
102	302	
103	303	

```
3 rows in set (0.00 sec)

mysql> select STUDENT.Stud_Iname,STUDENT.Stud_fname,SECTION.Course_Code,ENROLLMENT.Section_Id from STUDENT inner join SECTION inner join ENROLLMENT on STUDENT.Stud_No=ENROLLMENT.Stud_No and SECTION.Section_Id=ENROLLMENT.Section_Id group by ENROLLMENT.Grade;
```

Stud_Iname	Stud_fname	Course_Code	Section_Id
Miranta	Johny	20MCA200	301

```
1 row in set (0.00 sec)

mysql> select STUDENT.Stud_Iname,STUDENT.Stud_fname,SECTION.Course_Code,ENROLLMENT.Section_Id from STUDENT inner join SECTION inner join ENROLLMENT on STUDENT.Stud_No=ENROLLMENT.Stud_No and SECTION.Section_Id=ENROLLMENT.Section_Id;
```

Stud_Iname	Stud_fname	Course_Code	Section_Id
Miranta	Johny	20MCA200	301
Nimisha	HH	20MCA204	303

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

V. Optimizing databases (Join, Aggregate & Set operations, Other operators like arithmetic, logical, special etc):

25. Use an inner join between the STUDENT and ENROLLMENT tables for showing the full name, Section id and Grade.

```
mysql> select * from STUDENT;
```

Stud_No	Stud_Iname	Stud_fname	Stud_address	Stud_City	State	Postalcode
101	Miranta	Johny	ABC	KLM	K	686691
102	Kavya	Boban	DEF	ANGAPALLY	K	683572
103	Nimisha	MM	GHI	ANGAPALLY	K	683572
104	Anagha	Chacko	JKL	KLM	K	686691
105	Irin	Alli	MNO	MUVATTUPUZHA	K	686661
106	Bhavya	Manoj	PQR	MUVATTUPUZHA	K	686661
107	Liya	Jaison	STU	KOCHI	K	683677

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

```
mysql> select * from ENROLLMENT;
```

Stud_No	Section_id	Grade
101	301	
102	302	
103	303	

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

```
mysql> select STUDENT.Stud_fname,STUDENT.Stud_Iname,ENROLLMENT.Section_id,ENROLLMENT.Grade from STUDENT inner join ENROLLMENT on STUDENT.Stud_No=ENROLLMENT.Stud_No;
```

Stud_fname	Stud_Iname	Section_id	Grade
Johny	Miranta	301	
Boban	Kavya	302	
MM	Nimisha	303	

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

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

```
mysql> select * from STUDENT;
```

Stud_No	Stud_Iname	Stud_fname	Stud_address	Stud_City	State	Postalcode
101	Miranta	Johny	ABC	KLM	K	686691
102	Kavya	Boban	DEF	ANGAPALLY	K	683572
103	Nimisha	MM	GHI	ANGAPALLY	K	683572
104	Anagha	Chacko	JKL	KLM	K	686691
105	Irin	Alli	MNO	MUVATTUPUZHA	K	686661
106	Bhavya	Manoj	PQR	MUVATTUPUZHA	K	686661
107	Liya	Jaison	STU	KOCHI	K	683677

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

```
mysql> select * from ENROLLMENT;
```

Stud_No	Section_id	Grade
101	301	
102	302	
103	303	

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

```
mysql> select STUDENT.Stud_fname,STUDENT.Stud_Iname,ENROLLMENT.Section_id,ENROLLMENT.Grade from STUDENT left join ENROLLMENT on STUDENT.Stud_No=ENROLLMENT.Stud_No;
```

Stud_fname	Stud_Iname	Section_id	Grade
Johny	Miranta	301	
Boban	Kavya	302	
MM	Nimisha	303	
Chacko	Anagha	NULL	NULL
Alli	Irin	NULL	NULL
Manoj	Bhavya	NULL	NULL
Jaison	Liya	NULL	NULL

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

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

```
mysql> select * from INSTRUCTOR;
+-----+-----+-----+-----+-----+
| Instructor_id | Instructor_lname | Instructor_fname | Instructor_phone | Salary |
+-----+-----+-----+-----+-----+
| 201          | Asha             |                 | 99999990         | 22000  |
| 202          | Ashna            |                 | 99999991         | 22550  |
| 203          | Sandeep          |                 | 99999992         | 33000  |
| 204          | Asifa            |                 | 99999993         | 44000  |
| 205          | George           |                 | 99999994         | 11000  |
+-----+-----+-----+-----+-----+
5 rows in set (0.05 sec)

mysql> UPDATE INSTRUCTOR set Salary=Salary*(Salary*7/100) where Salary<(select avg(Salary));
Query OK, 0 rows affected (0.05 sec)
Rows matched: 0 Changed: 0 Warnings: 0

mysql> select * from INSTRUCTOR;
+-----+-----+-----+-----+-----+
| Instructor_id | Instructor_lname | Instructor_fname | Instructor_phone | Salary |
+-----+-----+-----+-----+-----+
| 201          | Asha             |                 | 99999990         | 22000  |
| 202          | Ashna            |                 | 99999991         | 22550  |
| 203          | Sandeep          |                 | 99999992         | 33000  |
| 204          | Asifa            |                 | 99999993         | 44000  |
| 205          | George           |                 | 99999994         | 11000  |
+-----+-----+-----+-----+-----+
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 * from INSTRUCTOR;
+-----+-----+-----+-----+-----+
| Instructor_id | Instructor_lname | Instructor_fname | Instructor_phone | Salary |
+-----+-----+-----+-----+-----+
| 201          | Asha             |                 | 99999990         | 22000  |
| 202          | Ashna            |                 | 99999991         | 22550  |
| 203          | Sandeep          |                 | 99999992         | 33000  |
| 204          | Asifa            |                 | 99999993         | 44000  |
| 205          | George           |                 | 99999994         | 11000  |
+-----+-----+-----+-----+-----+
5 rows in set (0.00 sec)

mysql> select Instructor_lname,Salary from INSTRUCTOR where Salary=(select max(Salary) from INSTRUCTOR);
+-----+-----+
| Instructor_lname | Salary |
+-----+-----+
| Asifa            | 44000  |
+-----+-----+
1 row in set (0.00 sec)

mysql> select Instructor_lname,Salary from INSTRUCTOR where Salary=(select max(Salary) from INSTRUCTOR) or Instructor_lname in (select Instructor_lname from INSTRUCTOR where Instructor_lname like '%a');
+-----+-----+
| Instructor_lname | Salary |
+-----+-----+
| Asha             | 22000  |
| Ashna            | 22550  |
| Asifa            | 44000  |
+-----+-----+
3 rows in set (0.05 sec)
```

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

```
mysql> select * from INSTRUCTOR;
+-----+-----+-----+-----+-----+
| Instructor_id | Instructor_lname | Instructor_fname | Instructor_phone | Salary |
+-----+-----+-----+-----+-----+
| 201          | Asha             |                 | 99999990         | 22000  |
| 202          | Ashna            |                 | 99999991         | 22550  |
| 203          | Sandeep          |                 | 99999992         | 33000  |
| 204          | Asifa            |                 | 99999993         | 44000  |
| 205          | George           |                 | 99999994         | 11000  |
+-----+-----+-----+-----+-----+
5 rows in set (0.00 sec)

mysql> select * from INSTRUCTOR where Salary=(select min(Salary) from INSTRUCTOR);
+-----+-----+-----+-----+-----+
| Instructor_id | Instructor_lname | Instructor_fname | Instructor_phone | Salary |
+-----+-----+-----+-----+-----+
| 205          | George           |                 | 99999994         | 11000  |
+-----+-----+-----+-----+-----+
1 row in set (0.05 sec)
```

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

```
mysql> select * from STUDENT;
```

Stud_No	Stud_lname	Stud_fname	Stud_address	Stud_City	State	Postalcode
101	Miranta	Johny	ABC	KLM	K	686691
102	Kavya	Boban	DEF	ANGAWALY	K	683572
103	Nimisha	PM	GHI	ANGAWALY	K	683572
104	Anagha	Chacko	JKL	KLM	K	686691
105	Irin	Ali	MNO	MUVATTUPUZHA	K	686661
106	Bhavya	Manoj	PQR	MUVATTUPUZHA	K	686661
107	Liya	Jaison	STU	KOCHI	K	683677

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



```
mysql> select * from STUDENT where Stud_City='KOCHI' and 'KERALA' or 'BANGALORE' and 'KARNATAKA' or Stud_City in('KOCHI','KERALA','BANGALORE');
```

Stud_No	Stud_lname	Stud_fname	Stud_address	Stud_City	State	Postalcode
107	Liya	Jaison	STU	KOCHI	K	683677

```
1 row in set, 2 warnings (0.00 sec)
```