C. U. SHAH UNIVERSITY,WADHWAN CITY.

Faculty of: **Computer Science**
Course: **Master of Computer Applications**
Semester**: I**
Subject Code**: 5CS01CDM1**
Subject Name: **Database Management System**

Sr. No	Subject Code	Subject Name	Teaching hours/ Week			Credit hours	Credit Points	Evaluation Scheme/ Semester								Total
			Th	Tu	Pr			Theory				Practical				
								Internal Assessment		End Semester Exams		Internal Assessment		End Semester Exams		
								Marks	Duration	Marks	Duration	Marks	Duration	Marks	Duration	
3	5CS01CDM1	Database Management System	4	--	4	8	6	30	1½	70	2½	--	--	50	1½	150

Objectives
- This course is designed to make student familiar with the fundamental concepts of DBMS for designing and implementing database systems by using the tools like SQL..

Prerequisites
Basic knowledge of working with computer.

Course Outline

Sr. No.	Course Contents	Number of Hours
1	**Database Concepts and Architecture** Preliminary concepts: data, database, database systems, database management systems, Components of database system, Functions of DBMS Characteristics and elements of database system Schema, Instance and Database State Database Applications, Purpose and Advantages of Database Management System (over file systems), View of Data (Data Abstraction, Data Models) Data Storage and Querying (Components, Storage Manager, Query Processor) Database Architecture (Client/Server and Three Tier Architecture) Database User and Administrators	10
2	**Features of Entity Relationship Diagram** Entity Relational Model (Entity Sets, Relationship Sets, Attributes), Constraints (Mapping Cardinalities, Keys, Participation Constraints), Entity Relationship Diagram, Weak Entity Set, Extended E-R Features	10

	(Generalization, Specialization and Aggregation), E-R Notations	
	Examples of ERD	
3	**Relational Model and Database Design**	12
	Relational structure – tables (relations), rows (tuples), domains, columns (attributes)	
	Database design process, Anomalies in a database	
	Functional Dependencies (Definition, Types of Functional Dependency)	
	Decomposition: (Definition, Loosy Decomposition, Lossless join decomposition,	
	Dependency preserving decomposition) Closure set of FD, Canonical Cover	
	Normalization up-to 3NF	
4	**Introduction to SQL**	
	Basic Data Types of ORACLE	
	Data Definition Language (DDL)	
	Data Manipulation Language (DML)	
	Data Control Language (DCL)	10
	Transaction Control Language (TCL)	
	Data Constraints, Inbuilt Functions	
	Subqueries, Join, Indexes, Views, Sequences, Synonyms, Set Operators	
	ORACLE Utility – Import, Export	
5	**Relational Algebra**	
	Native Relational Operations (Selection, Projection, Join, Difference)	
	Additional Operations (Rename, Assignment, Generalized Projection, Aggregation)	06
	Relational Algebra Examples	
	Total hours	**48**

PRACTICAL LIST:

1	➢ Create the following tables:
	1. Create LOCATION Table with columns Location_Id, Regional_Group.
	Constraints on LOCATION table: Location_Id Primary Key.
	2. Insert the following records into the table LOCATION:
	LOCATION_ID REGIONAL_GROUP
	------------ -----------------------------
	122 NEW YORK
	123 DALLAS
	124 CHICAGO
	167 BOSTON

3. Create DEPARTMENT Table with columns Department_Id, Name, Location_ID.

   Constraints on DEPARTMENT table: Department_Id Primary Key, Location_Id references

   LOCATION table.

4. Insert the following records into DEPARTMENT table:

DEPRATMEMT_ID	NAME	LOCATION_ID
-----------------------	--------------------	--------------------
10	ACCOUNTING	122
20	RESEARCH	124
30	SALES	123
40	OPERATIONS	167

5. Create JOB Table with columns Job_Id, Funcation.

   Constraints on JOB table: Job_ID Primary Key.

6. Insert the following records into JOB table:

JOB_ID	FUNCTION
------------------	-------------------
667	CLERK
668	STAFF
669	ANALYST
670	SALESPERSON
671	MANAGER
672	PRESIDENT

7. Create EMPLOYEE Table with columns Employee_Id, Last_Name, First_Name, Middle_Name,

   Job_Id, Manager_Id, Hire_Date, Salary, Comm, Department_ID.

   Constraints on EMPLOYEE table: Employee_Id Primary Key, Last_Name NotNull,

   Department_Id references DEPARTMENT table.

8. Insert the following records into EMPLOYEE table:

EMPLOYEE_ID	LAST_NAME	FIRST_NAME	MIDDLE_NA	JOB_ID	MANAGER_ID	HIRE_DATE	SALARY	COMM	DEPARTMENT_ID

			ME						
7369	SMITH	JOHN	Q	667	7902	17-DEC-84	800	NULL	20
7499	ALLEN	KEVIN	J	670	7698	20-FEB-85	1600	300	30
7505	DOYLE	JEAN	K	671	7839	04-APR-85	2850	NULL	30
7506	DENNIS	LYNN	S	671	7839	15-MAY-85	2750	NULL	30
7507	BAKER	LESLIE	D	671	7839	10-JUN-85	2200	NULL	40
7521	WARK	CYNTHIA	D	670	7698	22-FEB-85	1250	500	30

2

➢ Perform the following queries on the tables given in Set no. 1:

1. List all job details.
2. List all the locations.
3. List out first name,last_name,salary, commission for all employees.
4. List out employee_id,last_name,department_id for all employees and rename employee_id as "ID of the employee", last_name as "Name of the employee", department_id as "department ID".
5. List out the employee's annual salary with their names only.
6. List out the employees who are working in department 20.
7. List out the employees who are earning salary between 3000 and 4500.
8. List out the employees who are working in department 10 or 20.
9. List out the employees whose name starts with "S".
10. List out the employees whose name length is 4 and start with "S"

3

➢ Perform the following queries on the tables given in Set no. 1:

1. List out the employee id, last name in ascending order based on the employee id.
2. List out the employee id, name in descending order based on salary column.
3. List out the employee details according to their last_name in ascending order and salaries in descending order.
4. List out the employee details according to their last_name in ascending order and then on

		department_id in descending order.
	5.	How many employees who are working in different departments wise in the organization
	6.	List out the department wise maximum salary, minimum salary, average salary of the employees
	7.	List out the no. of employees for each month and year, in the ascending order based on the year, month.
	8.	List out the department id having at least four employees.
	9.	How many employees in January month.
	10.	Which is the department id, having greater than or equal to 3 employees joined in April 1985.
4	➢	Perform the following queries on the tables given in Set no. 1:
	1.	Display the employee who got the maximum salary.
	2.	Display the employees who are working in Sales department.
	3.	Display the employees who are working as "Clerk".
	4.	Find out no. of employees working in "Sales" department.
	5.	List our employees with their department names.
	6.	Display employees with their designations (jobs).
	7.	How many employees who are working in different departments and display with department name.
	8.	How many jobs in the organization with designations.
	9.	Display employee details with all departments.
	10.	List out the common jobs in Research and Accounting Departments in ascending order.
5	➢	Create the following tables:
	1.	Create STUDENT Table with fields rollno, name, class, birthdate
		Constraints on STUDENT table: rollno primary key and rollno must start with latter 'R'.
	2.	Insert the following records into Student Table:

ROLLNO NAME   CLASS   BIRTHDATE

---------- ------------   --------   ---------- ---------

R1   Pritesh Patel   A   23-FEB-89

R2   Sugeet Patel   A   05-SEP-85

R3   Dipesh Patel   B   24-MAR-76

R4   Chandresh patel   B   17-APR-87

R5   Bhavin Jilvaani   A   25-DEC-75

3. Create COURSE Table with fields courseno, coursename, max_marks, pass_marks

Constraints on COURSE table: courseno primary key, check for max_mark>0, also check for pass_mark>0 and pass_marks<max_marks.

4. Insert the following records into Course Table:

COURSENO	COURSENAME	MAX_MARKS	PASS_MARKS
610001	FOP	90	40
610002	FOP Prac	90	40
610003	MATHS	90	40
610004	COMP ORG	90	40
610005	DBMSI	90	40
610006	SQL & PL/SQL	90	40
610007	ERFM	90	40

1. Create SC Table with fields rollno, courseno, marks:

Constraints on Sc table: marks must be greater than 0, rollno, courseno primary key, rollno references students and couseno references course.

2. Insert the following records into SC Table:

ROLLNO	COURSENO	MARKS
R3	610005	70
R3	610001	70
R3	610002	68
R3	610003	58
R3	610004	74
R3	610006	59
R3	610007	55
R1	610001	80
R1	610002	89
R1	610003	78
R1	610004	88
R1	610005	76
R1	610006	85
R1	610007	90

	R2	610001	90
	R2	610002	85
	R2	610003	78
	R2	610004	75
	R2	610005	68
	R2	610006	59
	R2	610007	74
	R4	610001	75
	R4	610002	45
	R4	610003	58
	R4	610004	68
	R4	610005	78
	R4	610006	62
	R4	610007	63
	R5	610001	70
	R5	610002	78
	R5	610003	52
	R5	610004	79
	R5	610005	85
	R5	610006	76
	R5	610007	80

6   ➢ Perform the following queries on the tables given in Set no. 5:

1. Add constraint that marks entered are between 0 to 100 only.

2. While creating COURSE table, primary key constraint was forgotten. Add the primary key now.

3. Display details of student where course is 'Data Base Management System'

4. Select student names who have scored more than 70% in Computer Networks and have not failed in any subject.

5. Select names and class of students whose names begin with 'A' or 'B'.

6. Display average marks obtained by each student.

7. Select all courses where passing marks are more than 30% of average maximum marks.

8. Select the course where Second and third characters are 'AT'

9. Display details of students born in 1975 or 1976.

10. Find out the cousewise average marks from SC table.

7   ➢ Perform the following miscellaneous queries:

1. Add 15 days to current date.

2. Add and subtract 5 months from current month.

3. Calculate months between current months and '3-7-2008'

4. Find last day of current month.

5. How many days left in a current month?

6. Find ASCII value of letter 'R'.

7. Find name of all constraint based on particular table.

8. Find difference between current date and specified date.

9. Find username and userid from current login.

10. Find the occurrence of 'or' in the string.

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8 | ➢ Create the following tables:

1. Create the table SCREEN with the fields (screen_id, location, seating_cap)

Constraints on SCREEN table: screen_id primary key, location not null, seating_cap not null, Screen_Id must start with S, location values must be either FF,SF or TF, seating_cap must be greater then 0.

2. Insert the following records into SC Table:

```
 SCREEN_ID    LOCATION    SEATING_CAP

 ----------------   ----------------   ---------------------
 S1               SF                      400
 S2               TF                      350
 S3               TF                      250
 S4               SF                      300
 S5               TF                      170
```

3. Create the table MOVIE with the fields (movie_id, movie_name, date_of_release)

Constraints on MOVIE table: movie_id primary key, movie_name unique, date_of_release not null.

4. Insert the following records into the table MOVIE:

```
MOVIE_ID   MOVIE_NAME    DATE_OF_RELEASE

--------------   --------------------   -------------------------------
M01            Star Wars III            11-SEP-09
M02            Oceans 13                10-JUL-09
M03            Armageddon               18-FEB-05
M04            Step up                  27-SEP-02
M05            Terminator-3             25-OCT-05
```

5. Create the table CURRENT1 with the fields (screen_id, movie_id, date_of_arrival, date_of_closure)

Constraints on CURRENT1 table: screen_id references SCREEN table, movie_id references MOVIE, date_of_arrival not null, date_of_closure not null, check for date_of_arrival<date_of_closure.

6. Insert the following records into the table CURRENT1:

```
SCREEN_ID   MOVIE_ID   DATE_OF_ARRIVAL   DATE_OF_CLOSURE
----------------------------------------------------------------------------------------
   S1          M01        13-JUL-09          26-AUG-09
   S2          M03        25-APR-04          03-MAY-04
   S3          M02        05-JAN-09          25-FEB-09
   S4          M04        16-MAR-09          20-APR-09
   S5          M05        03-MAY-05          09-JUL-05
```

9	➢ Perform the following queries on the tables given in Set no. 8:
	1. Get the name of movie which has run the longest in the multiplex so far.
	2. Get the average duration of a movie on screen number 'S4'.
	3. Get the details of movie that closed on date 24-november-2004.
	4. Movie 'star wars III' was released in the 7th week of 2005. Find out the date of its release considering that a movie releases only on Friday.
	5. Get the full outer join of the relations screen and current.
10	➢ Create the following tables:
	1. Create the table DISTRIBUTOR with the fields (DNO, DNAME, DADDRESS, DPHONE)
	Constraints on table DISTRIBUTOR: dno primary key, dname not null.
	2. Insert the following records into the table DISTRIBUTOR

```
DNO     DNAME           DADDR           DPHONE
-------  --------------------  ------------------   ---------------- D01
         Hardik          Ode             9315462
D02     Dhaval          Anand           9325135
D03     AAAAOH          Baroda          9563154
D04     Mr. Talkative   Vasad           9321354
D05     Dipen           Thasara         9345432
```

3. Create the table ITEM1 with the fields (ITEMNO, ITEMNAME, COLOR, WEIGHT)

   Constraints on table ITEM1: itemno primary key, itemname not null, check for weight>0

4. Insert the following records into the table ITEM1:

```
ITEMNO  ITEMNAME  COLOUR          WEIGHT
-------------  ----------------  -----------------  ------------
I01     Screw           Black           20
I02     Bolt            white           100
I03     Nut             red             50
I04     Hammer          green           75
I05     Washer          red             110
I06     Wire            Gray            37
I07     Nail            Green           46
```

5. Create the table DIST_ITEM with the fields (DNO, ITEMNO, QTY):
   Constraints of table DIST_ITEM: dno references DISTRIBUTOR table, itemno references ITEM table

6. Insert the records into the table DIST_ITEM:

DNO	ITEMNO	QTY
D01	I02	130
D02	I01	500
D03	I05	420
D04	I03	320
D05	I06	160
D02	I04	190
D01	I07	462
D05	I01	256
D03	I04	315

11	➤ Perform the following queries on the tables given in Set no. 10:
	1. Add column CONTACT_PERSON to the distributor table with the not null constraint.
	2. Create a view LONDON_DIST on DIST_ITEM which contains only those records where distributors are from London. Make sure that this condition is checked for every DML against this view.
	3. Display detail of all those item that have never been supplied. Select * from item1 where itemno not in(select itemno from dist_item) no rows selected.
	4. Delete all those items that have been sulpplied only once.
	5. List the names of distributors who have an 'A' and also a 'B' somewhere in their names.
12	➤ Perform the following queries on the tables given in Set no. 10:
	1. Count the number of items having the same color but not having weight between 20 and 100
	2. Display all those distributors who have supplied more than 1000 parts of the same type.
	3. Display the average weight of items of same colour provided at least one items have that colour.
	4. Display the position where a distributor name has an 'OH' in its spelling somewhere after the forth character.
	5. Count the number of distributors who have a phone connection and are supplying item number 'I100'.
13	➤ Perform the following queries on the tables given in Set no. 10:
	1. Create a view on the table in such a way that the view contains the distributor name, item name and the quantity supplied.
	2. List the name, address and phone number of distributors who have the same three digits in their number as 'Mr. Talkative'.
	3. List all distributor names who supply either item I01 or I07 and the quantity supplied is more than 100.
	4. Display the data of the top three heaviest ITEMS.
	5. Count the total quantity group by itemno.
14	➤ Create the following tables:
	1. Create the table WORKER with the fields (worker_id, name, wage_per_hour, specialized_in, manager_id)
	Constraints on table WORKER: worker_id primary key, name not null, manager_id primary key, check for wage_per_hour>=0.
	2. Insert the following records into the table WORKER:

WOR	NAME	WAGE_PER_HOUR	SPECIALISED_IN	MAN
-------	---------------	---------------------------	-------------------------	-------
W01	Mr.Cacophonix	50	Polishing	M01

W02	Dhaval	40		Polishing	M02
W03	Dipen	35		Fitting	M03
W04	Hardik	30		Marketing	M04
W05	Jigar	55		Fitting	M05

3. Create the table JOB with the fields (job_id, type_of_job, status):

4. Insert the following records into the table JOB:

```
JOB    TYPE_OF_JOB      S

------ ---------------------  -
J01          Packing      A
J02          Editing      A
J03          Moulding     B
J04          Accounting   B
J05          Printing     B
```

5. Create the table JOB_ASSIGNED with the fields (worker_id, job_id, starting_date, number_of_days)

   Constraints on table JOB_ASSIGNED: worker_id references WORKER table, job_id references JOB table.

6. Insert the following records into the table JOB_ASSIGNED:

```
WOR  JOB    STARTING_ NUMBER_OF_DAYS

------- ------  ----------- ----- ----------------------------
W01   J01   15-SEP-09        35
W02   J01   20-SEP-08        34
W03   J04   12-OCT-09        39
W01   J05   19-OCT-09        10
W02   J04   12-SEP-08        25
```

15	➢ Perform the following queries on the tables given in Set no. 14: 1. Display the date on which each worker is going to end his presently assigned job. 2. Display how many days remain for each worker to finish his job. 3. Display the STARTING_DATE in the following format - 'The fifth day of month of October, 2004'. 4. Change the status to 'Complete' for all those jobs, which started in year 2008. 5. Display job details of all those jobs where at least 25 workers are working. 6. Display all those jobs that are already incompleted.
16	➢ Perform the following queries on the tables given in Set no. 14: 1. Find all the jobs, which begin within the next two weeks. 2. List all workers who have their wage per hour ten times greater than the wage of their

		managers.
	3.	List the names of workers who have been assigned the job of Packing.
	4.	What is total number of days allocated for printing on the goods for all the workers together.
	5.	Which workers receive higher than average wage per hour.
17	➢	Perform the following queries on the tables given in Set no. 14:
	1.	Display details of workers who are working on more than one job.
	2.	Which workers having specialization in polishing start their job in September?
	3.	Display details of workers who are specialized in the same field as that of Mr.Cacophonix or have a wage per hour more than any of the workers.
	4.	Find the names of the workers who are getting more then 50 Rs. as wages per hour.
	5.	Find the jobs which are assigned after 31-DEC-2008.
18		1. Create the following table named table as CUSTOMER with following fields-Cust_No, First_Name, Last_Name, Address, City, State, Pin, B_Date, Status.
		Constraints on table CUSTOMER: Cust_No Primary Key, First_Name Not Null and the values for status must be in ('V','I','A').
		2. Insert the following records into the table CUSTOMER:

CUST_NO	FIRST_NAME	LAST_NAME	ADDRESS	CITY	STATE	PIN	B_DATE	STATUS
-------	-------- ---	-------- ---	-----------	-----	---------- -	------ ----	------ -	---- ---
1003	RAJ	BAHADUR	SHANTI VILLA	UDP	KARNATAKA	576101	1-AUG-70	V
1004	FELIX	SIMON	M-J-56	PJM	GOA	403002	12-FEB-71	A
1005	RAJAN	KUTTY	A1 TRADERS	KNR	KERALA	670001	9-JUN-71	A
1006	SHILPA	PAI	12/4B	MNG	KARNATAKA	574154	11-DEC-70	I
1007	BOSC	RAKS	R.K.	BN	KARN	5762	1-	A

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| 19 | ➢ Perform the following queries on the tables given in Set no. 18: |

1. Display all the records from the table where state is KARNATAKA.

2. Delete the row from the table where PIN CODE is 576201.

3. Change the ADDRESS as "KAVI MUDDANNA MARG" AND PIN=576104 where CUST_NO=1003.

4. Delete the records of KARNATAKA state from the table and then retrieve all the records back.

5. Select all the records with single occurrence of state from the table.

6. Sort and display the customer data, in the alphabetic order of state.

7. Sort and display the state field in the in descending order.

8. Retrieve records of Karnataka / Kerala customers who are ACTIVE ('A').

9. Retrieve rows where name contains the word RAJ embedded it.

10. Display all the rows whose dates are in the range of 10-JAN-70 and 31-JUL-96.

Learning Outcomes

- Enable the student to model the real world data into database framework.
- Creation of conceptual design using tools like E-R Diagram.
- Clear understanding of how to map the logical design of database into physical design.
- To get familiar with the SQL query environment.
- Representation of queries into equivalent relational algebraic expression

Books Recommended:-

1. Database System Concepts, **Silberschatz, Korth, Sudarshan**, 5th Edition, Publisher-McGraw Hill Publication

2. Fundamentals of Database Systems, **Elmsari, Navathe**, 5th Edition, Publisher-Pearson Education (2008)

3. An Introduction to Database Systems, **C J Date, A Kannan, S Swaminathan**, 8th Edition, Publisher-Pearson Education (2006)

NPTEL Resources:
1. Fundamentals of Database Systems(Course sponsored by Aricent), IIT Kanpur Dr. Arnab Bhattacharya
https://nptel.ac.in/courses/106104135