SILIGURI INSTITUTE OF TECHNOLOGY

COMPUTER SCIENCE & ENGINEERING

COURSE FILE

2ND SEM, 3RD YEAR, 2017

PAPER NAME : Database Management System

PAPER CODE : CS 601 & CS 691

Vision of CSE dept.

To be a nationwide recognized department that produces versatile computer engineers, capable of adapting to the changing needs of computer and related industry.

Mission of CSE dept.

- To impart quality technical education with skills, knowledge and attitude to succeed in Computer Science & Engineering careers.
- To provide knowledge of emerging trends in computer and related industry and foster environment of lifelong learning.
- To develop graduate engineers who investigate research, design and find workable solutions to complex engineering problems with awareness and concern for society and environment.

PROGRAM EDUCATIONAL OBJECTIVES (PEOs) of CSE dept.

The graduates will be:

- Competent professionals with knowledge of Computer Science & Engineering to pursue variety of careers/higher education.
- Proficient in successfully designing innovative solutions to real life problems that are technically sound, economically viable and socially acceptable.
- Efficient team leaders, effective communicators and capable of working in multi-disciplinary environment following ethical values.
- Capable of adapting to new technologies and constantly upgrade their skills with an attitude towards lifelong learning.

PROGRAM OUTCOMES (PO)

Engineering Graduates will be able to:

- **Engineering knowledge:** Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems.
- **Problem analysis:** Identify, formulate, review research literature, and analyze complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences.
- **Design/development of solutions:** Design solutions for complex engineering problems and design system components or processes that meet the specified needs with appropriate consideration for the public health and safety, and the cultural, societal, and environmental considerations.
- **Conduct investigations of complex problems:** Use research-based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions.

- **Modern tool usage:** Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools including prediction and modeling to complex engineering activities with an understanding of the limitations.
- **The engineer and society:** Apply reasoning informed by the contextual knowledge to assess societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to the professional engineering practice.
- **Environment and sustainability:** Understand the impact of the professional engineering solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development.
- **Ethics:** Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice.
- **Individual and team work:** Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.
- **Communication:** Communicate effectively on complex engineering activities with the engineering community and with society at large, such as, being able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions.
- **Project management and finance:** Demonstrate knowledge and understanding of the engineering and management principles and apply these to one's own work, as a member and leader in a team, to manage projects and in multidisciplinary environments.
- **Life-long learning:** Recognize the need for, and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change.

PSOs of CSE Dept

- **Apply probability, statistics, mathematics through differential and integral calculus, sciences including applications appropriate to the Computer Science & Engineering topics.**

- **Use algorithms, data structures/management, software design, concepts of programming languages and computer organization & architecture.**

Course File

Course Title/Code: Database Management System/CS601 & CS691

Semester:- 2nd Year:- 3rd Group:- B

Name of the Faculty: **Prof. Dr. Bidyut Biman Sarkar, Prof. Jayashree Singha**
E-mail : jaysin31m85@gmail.com

Class Schedule:

Day	Monday [L]	Tuesday [L]	Wednesday [L]	Thursday [L]	Friday [L]
Timing(B)	12.30 PM – 1.20 PM	11:40 AM- 12.30 PM	10.50 AM-11:40 AM	3.00 PM-3.50 PM	---

Laboratory Schedule:

Day	Monday	Tuesday	Wednesday	Thursday	Friday
Group B1	2:10 PM -4.40 PM	---	---	---	---
Group B2	---	---	2:10 PM – 4:40 PM	---	---

Hours of Meeting Students:- Tuesday & Friday (3:00 PM – 4:30PM) /By Appointment

i) Course Objective:

Students will be able to design normalized database and apply it to build secure and efficient applications.

ii) Course Outcomes:

After completion of this course the students are expected to be able to demonstrate following knowledge, skills and attitudes.

a) **The Students will be able to:**

Course Outcomes	Targets
Describe the fundamental concepts of database system and **construct** Entity-Relationship (E-R) model from specifications and **convert** an E-R schema to relation schema using mapping algorithm. **[BT - Level – 3]**	65% marks
Identify query processing methodologies of Relational Algebra, Relational Calculus and determine the query optimization techniques. **[BT - Level – 4]**	65% marks
Construct simple and moderately advanced database queries using SQL and PL/SQL blocks for ensuring data integrity and security. **[BT - Level – 6]**	65% marks
Explain the concepts of normalization and **apply** such knowledge to the normalization of a database; and be able to **identify** basic database storage structures and access	65% marks

techniques. **[BT - Level – 4]**	
Implement the basic issues of transaction processing, concurrency control and recovery mechanisms in applications. **[BT - Level – 3]**	65% marks

b) Once the student has successfully complete this course, he/she must be able to answer the following questions or perform/demonstrate the following:

SN	QUESTION	BT-LEVEL
1.	What do you **understand** by database and database management system?	2
2.	**Explain** the 3-schema architecture of DBMS. How are these different schema layers related to the concepts of logical and physical data independence?	2
3.	What do you **understand** by physical and logical data independence and why are they important?	2
4.	**Describe** the role of DBA.	2
5.	**Explain** the following terms briefly: attribute, domain, entity, relationship, entity set, relationship set, one-to-many relationship, many-to-many relationship, participation constraint, overlap constraint, covering constraint, weak entity set, specialization, generalization, aggregation, and role indicator.	2
6.	**Describe** a banking system database with the help of suitable ERD.	2
7.	**Use** mathematical notations of relational algebra to express a database query. Consider the following tables: SUPPLIER (SUPPLIER _ID, SUPPLIER_NAME, SUPPLIER_ADDRESS) PARTS (PART_ID, PART_NAME, COLOR) CATALOG (SUPPLIER_ID, PART_ID, COST) Write the following queries in Relational Algebra based on above mentioned tables: a. Find names of the suppliers who supply 'YELLOW' parts. b. Find names of the suppliers who supply both 'BLUE' and 'RED' parts. c. Find name of the supplier who supply all parts.	3
8.	**Use** mathematical notations of relational calculus to express a database query. Consider the following tables: EMPLOYEE (EMPLOYEE_NO, EMPLOYEE_NAME, CITY) WORKS (EMPLOYEE_NO, COMPANY_NAME, SALARY) Write the following query in Tuple and Domain Relational Calculus: Find the name and city of residence of all employees who work for TCS	3

	Company.	
9.	**Construct** simple and nested **queries** on a given database system using SQL. Consider the following tables: EMPLOYEE (EMP_CODE, EMP_NAME, DESIGNATION, HEAD, DOJ, BASIC, DEPT_CODE) DEPARTMANT (DEPT_CODE, DEPT_NAME, LOCATION) **Write** the following queries in **SQL** a. List the names of the employees who are earning more than the lowest salary of an employee in department 30. b. List of only those DEPT_CODE where the total salary is greater than 20000. c. List the names of those employees whose names either starts or ends with 'S'. d. List the names of the employees along with the name of the people under whom they are working.	6
10.	**Explain** the concepts of functional dependency, multivalued dependency and join dependency.	2
11.	**Find** the closure of the following set F of functional dependencies for the relation schema R. R=(A, B, C, D,E); F={ A→BC, CD→E, B→D, E→A}	4
12.	Consider the relation schema R(A, B, C) with a set of functional dependencies F={A→BC, B→C, A→B, AB→C}. **Find** the irreducible set for F.	4
13.	Consider a relation schema R(A, B,C, D, E, F) with set of functional dependencies F = {A→BCDEF, BC→ADEF, B→F, D→E }. i) **Find** the candidate keys for R. ii) Decompose R to 3NF. iii) If another functional dependency D→B is introduced, what will be the resulting decomposed relation schema? iv) Is the decomposition lossless ?	4
14.	**Describe** each of the following indexing techniques with suitable example: primary, secondary and clustered indexing.	2
15.	**Compare** and contrast between: i) **B**-tree and B^+ tree organization	4
16.	**Construct** a B^+ tree for the following set of key values: [5, 10, 15, 20, 25, 30, 35, 40, 50, 55, 65,70, 75, 80, 90, 95] when the number of pointers that will fit in one node is: 5 i. Insert 60 ii. Delete 15, 75	6
17.	**Discuss** the ACID properties of database.	2
18.	**Write** the differences among 2PL and Strict 2PL? Which one is	1

	advantageous and why?	
19.	**Determine** whether the following schedule S is conflict or serial? S: [R3(y); R3(z); R1(x); W1(x); W3(z); W3(y); R2(z); R1(y); W1(y); R2(y); W2(y); R2(x); W2(x)] If conflict then, find the equivalent serial schedule.	2
20.	**Describe** log-based and non-log based recovery techniques.	2

Database Management System Syllabus [in Chapters]
Code: CS601
Contact: 3L

CHAPTER 1: [4L]
Introduction
Concept & Overview of DBMS, Data Models, Database Languages, Database Administrator, Database Users, Three Schema architecture of DBMS.

CHAPTER 2: [6L]
Entity-Relationship Model
Basic concepts, Design Issues, Mapping Constraints, Keys, Entity-Relationship Diagram, Weak Entity Sets, Extended E-R features.

CHAPTER 3: [5L]
Relational Model
Structure of relational Databases, Relational Algebra, Relational Calculus, Extended Relational Algebra Operations, Views, Modifications Of the Database.

CHAPTER 4: [8L]
SQL and Integrity Constraints
Concept of DDL, DML, DCL. Basic Structure, Set operations, Aggregate Functions, Null Values, Domain Constraints, Referential Integrity Constraints, assertions, views, Nested Sub-queries, Database security application development using SQL, Stored procedures and triggers.

CHAPTER 5: [9L]
Relational Database Design
Functional Dependency, Different anomalies in designing a Database., Normalization using functional dependencies, Decomposition, Boyce-Codd Normal Form, 3NF, Normalization using multi-valued dependencies, 4NF, 5NF

CHAPTER 6: [7L]
Internals of RDBMS
Physical data structures, Query optimization: join algorithm, statistics and cost based optimization. Transaction processing, Concurrency control and Recovery Management: transaction model properties, state serializability, lock base protocols, two phase locking.

CHAPTER 7: [6L]
File Organization & Index Structures
File & Record Concept, Placing file records on Disk, Fixed and Variable sized Records, Types of Single-Level Index (primary, secondary, clustering), Multilevel Indexes, Dynamic Multilevel Indexes using B tree and B+ tree .

c) Chapter Layout

Chapter No.	Chapter	Lecture Hours	Tutorials	Laboratory hours
Chapter - 1	Introduction	4 HRS	NOT APPLICABLE	
Chapter – 2	Entity-Relationship Model	6 HRS		
Chapter – 3	Relational Model	5 HRS		
Chapter – 4	SQL and Integrity Constraints	8 HRS		26 HRS
Chapter – 5	Relational Database Design	9 HRS		2 HRS
Chapter – 6	Internals of RDBMS	7 HRS		
Chapter – 7	File Organization & Index Structures	6 HRS		2HRS
Total		45 HRS		30 HRS

d) Text Books:
1. Henry F. Korth and Silberschatz Abraham, "Database System Concepts", Mc.Graw Hill.
2. Elmasri Ramez and Novathe Shamkant, "Fundamentals of Database Systems", Benjamin Cummings Publishing Company.

e) Reference:
1. James Martin, "Principles of Database Management Systems", 1985, Prentice Hall of India, New Delhi
2. "Fundamentals of Database Systems", Ramez Elmasri, Shamkant B.Navathe, Addison Wesley Publishing Edition
3. "Database Management Systems", Arun K.Majumdar, Pritimay Bhattacharya, Tata McGraw Hill

f) Evaluation Scheme:

1) THEORY

Evaluation Criteria	Marks
First & Second Internal Exam*	15
Quiz/ Assignments	10
Attendance	5
University Exam	70
Total	100

*Two internal examinations are conducted; based on those two tests, average of them are considered in a scale of 15.

University Grading System:

Grade	Marks
O	90% and above
E	80 – 89.9%
A	70 – 79.9%
B	60 – 69.9%
C	50 – 59.9%
D	40 – 49.9%
F	Below 40%

2) LABORATORY

Evaluation Criteria	Marks
Internal Exam*	40
University Exam	60
Total	100

***** Internal Evaluation will be based on daily lab performance as per the following schedule:

g) Laboratory Evaluation:

Experiment No.	Experiment Name	Schedule	Marks
P1	Q1. a) Create a table 'STUDENT' with following structures:- Col. Name Type Width ROLL NUMBER 2 NAME VARCHAR2 15 EXAMDATE DATE b) Add a primary key constraint on column 'NAME'. c) Drop the primary key of the table 'STUDENT'. d) Add a primary key on col. 'ROLL' in table 'STUDENT'. e) Insert following data:- **ROLL NAME EXAMDATE** 11 Sourav 01-JUN-10 12 Kamal 01-JUN-10 13 Rahul 01-JUN-10 14 Sovan 01-DEC-10 15 Shyamal 01-DEC-10	1	3

P2	Q2. a) Create a table 'MARKS' with following structures:- Col. Name Type Width ROLL NUMBER 2 MATH NUMBER 2 ENG NUMBER 3 **b)** Add a foreign key constraint on column 'ROLL' in 'MARKS' table referencing column 'ROLL' in table 'STUDENT' and name the constraint as FK_ROLL. c**)** Change width of 'MATH' column to 3. **d)** Add a check constraint on 'ENG' column so that permissible value for 'ENG' attribute lies between 0 and 50 and name the constraint as CHK_ENG. e**)** Try to insert following data:- <11,90,80> **f)** Now insert following data: ROLL MATH ENG 11 90 45 12 45 46 13 70 30 14 90 20 15 45 46 **g)** Add a new column 'TOTAL' in table 'MARKS'. The data type is number and width is 3. **h)** Update column 'TOTAL' in 'MARKS' table with proper data.	1	3
P3	**a)** Display data from table 'STUDENT' with column heading ROLL_NO, STD_NAME. **b)** List students having name starting with letter 'S'. **c)** List students where second character of name is 'a'. **d)** Display EXAMDATE in 'DD/MM/YYYY' format. **e)** Display NAME, MATH, ENG and PER of all students. Assume, total marks of math are 100 and eng is 50. **f)** Display names of all students who are getting above 65 of math. **g)** Display names of students getting marks in eng between 20 and 40. **h)** Display name of the student, who get the same marks (math) as that of 'Shyamal'.	1	3
P4	HOTEL (HOTEL_NO, NAME, ADDRESS) ROOM(ROOM_NO, HOTEL_NO, TYPE, PRICE) BOOKING(HOTEL_NO, GUEST_NO, DATE_FROM, DATE_TO, ROOM_NO) GUEST(GUEST_NO, NAME, ADDRESS) Where HOTEL contains hotel details and HOTEL_NO is the Primary Key. ROOM contains room details for each hotel and (HOTEL_NO,ROOM_NO) forms the Primary key. BOOKING contains details of the bookings and the Primary Key comprises (HOTEL_NO, GUEST_NO, DATE_FORM) and GUEST contains guest details and	2	3

	GUEST_NO is the Primary key and mention the Foreign Key constraints.		
P5	i. List full details of hotels in Mumbai ii. List the name and addresses of all guests in New Delhi, alphabetically ordered by the name. iii. List all double or family rooms with a price below Rs. 800 per day, in ascending ordered. iv. List the bookings for which no date_to has been specified. v. What is the total daily revenue from all the double room? vi. How many different guests have made booking for august, 2015 vii. List the price and type of all rooms at the hotel Land Mark. viii. What is the total income from booking for the hotel Manor today.	2	3
P6	**1.a)** Create tables for following functional Dependencies – eno → { ename,address} pno → {pname, plocation} {eno,pno} → hours plocation must be among MUMBAI,KOLKATA,CHENNAI, and DELHI. **b)** Mention primary key, foreign key and CHECK constraints. **c)** i. Insert following data for EMP:- **ENO ENAME ADDRESS** 1 Swarnali MUMBAI 2 Deboshree MUMBAI 3 Moumita KOLKATA 4 Piyali CHENNAI 5 Surupa DELHI **ii.** Insert following data for Proj:- ***PNO PNAME PLOCATION*** 101 BANKING DELHI 102 LIBRARY MUMBAI 103 RAILWAY KOLKATA 104 FINANCE CHENNAI 105 ANALYZER DELHI **iii.** Insert following data for EmpProj:- **ENO PNNO HOURS** 1 101 10 2 103 12 3 104 19 3 105 29 5 102 6 **d)** List the name of employees who are working on more than one project	3	3
P7	**2.a)** Create a table PHONE_BOOK. The fields of the table are NAME, ADRESS, PHONE_NO. **b)** Insert at least 6 entries into the table of which there are two pairs of duplicate entries.	3	3

	c) Delete duplicate rows from the table. **d)** Write a query to select first two rows from the table. **e)** Write a query to select last two rows from the table.		
P8	**3.a)** Create a table employee and insert following data into the table. EMPNO EMPNAME MANAGERNO SALARY E1 Amal -- 30,000 E2 Bimal E1 25,000 E3 Kamal E1 20,000 E4 Nirmal E2 15,000 E5 Shymal E2 21,000 E6 Parimal E3 10,000 **b)** Retrieve the names of the employees and the names of their respective managers from the employee table. **c)** Retrieve the name of the employee who is earning second maximum salary. **d)** Retrieve the name of the employee who is earning nth highest salary. **e)** Retrieve the names of employees whose salary is greater than the salary of all the employees whose manager no. is E1. **f)** Get the details of all employees whose salary is lesser than the average salary of the employee.	4	3
P9	**4.a)** Create a table account and insert following data into the table Account. ACCOUNTNO BRANCHNAME AMOUNT A1 Kolkata 50000 A2 Howrah 40000 A3 Howrah 40000 A4 Kolkata 20000 A5 Durgapur 30000 **b)** Create a view that will show branch name and total amount of that branch. The name of view will be acc_view. **c)** Select the branch names having total amount greater than 50,000 i) Using account1 view ii) Without using view. **5.a)** Create a table Marks and insert following data into the table. STUDENTNAME SUBJECT NAME MARKS Amit DBMS 80 Amit OS 70 Bimal DBMS 70 Bimal OS 70 **b)** Retrieve the name of the students who are getting marks in DBMS above 75 but who are getting marks in OS less than 75. **c)** Write a query to retrieve student names from the marks table and output will look like:- Mr. A Mr. A Mr. B	5	3

	Mr. B		

P10	6.Create a unique index on ENO column of the table EMP.
	
	7.The table Sales_Order_Detail(Product_No, Suppliers_No, Order_ID) has more 50,000 records for 500 distinct Product. Create an index on the Product_No column, which is the best suited according to the above stated scenario.
	
	8.Create the following object type rectangle with the attributes length, width and a method area (), which computes the area of the rectangle; as follows.
	CREATE TYPE rectangle AS OBJECT
	(length NUMBER,
	width NUMBER,
	MEMBER FUNCTION area RETURN NUMBER DETERMINISTIC
	);
	/
	CREATE OR REPLACE TYPE BODY rectangle AS
	MEMBER FUNCTION area RETURN NUMBER IS
	BEGIN
	RETURN (length*width);
	END;
	/
	Now, create a table rect_tab of type rectangle and create a function-based index on the method area().
	
	9.Make a group of 5 students. Open two terminals. From one terminal Login into the Oracle server with the user name FACULTY and password FACULTY. (This user has the ***CREATE USER*** system privilege. From the other terminal do the experiments with the newly created user.
	a. Create a user **STUDENT** with following characteristics
	1. The password student123
	2. Default tablespace **SYSTEM**, with a quota of 10 megabytes
	3. Temporary tablespace **TEMP**
	4. Access to the tablespace **SYSTEM**, with a quota of 5MB.
	5. Limits on database resources defined by the profile **DEFAULT**
	b. After successfully creating this user, try to connect using this username and password. Note the error message and state the reason.
		6	3

	c. Grant the role Connect to the user with admin option. d. Grant Resource and other necessary system privileges to this user. (e.g. Alter, Create, Insert, Delete, Grant etc.) e. Now Create the Table Employee(Eno Number(2), EName Varchar2(15)). f. Insert 3 records. Try different DML operations. 10.a. Log in as CSEA (User ID: CSEA, Password: CSEA). Display all records from the Employee table of the user Student. Try to insert or update any record. Note down the error. b. Grant the object privileges on the table STUDENT.EMPLOYEE to CSEA with without Grant option. c. Now do the experiments given in 2a. d. Log in as CSEA. Try to grant the object Privilege on STUDENT.EMPLOYEE to the user CSEB. Note down the error. How this can possible.		
P11	Write a PL/SQL program to check the given number is even or odd. Write a program to check whether a given number is prime or not. Write a PL/SQL program to check whether a number is Armstrong number or not.	7	3
P12	a) Write a procedure to calculate sum of two numbers. b) Write a PL/SQL function, which returns maximum of the three numbers. c) Write a function, which returns true if employee exist in employee table, otherwise it returns false. The Table is as follows: EMPLOYEE (ENO, ENAME, SALARY, MGRNO)	8	3
P13	a) Write a PL/SQL code block to calculate the area of a circle for a value of radius varying from 3 to 7. Store the radius and the corresponding values of calculated areas in table. b) Add an extra column diameter to the table circle and update the diameter column for each entry diameter=2* radius. c) Print the number of records in the circle table with the help of an explicit cursor. a)A HRD manager has decided to raise the salary for all the employees in department number 20 by 0.05. Whenever any such raise is given to employees an audit trail of the same is maintained in the **EMP_RAISE** table. The **EMP_RAISE** table holds the employee number, the date when the raise was given and the raise amount. b) Write a PL/SQL block to update the salary of each employee of dept-no 20 appropriately and insert a	9	3

	record in the **EMP_RAISE** table as well. Tables are as follows: EMPLOYEE (EMP_CODE, ENAME, JOB, SALARY. DEPTNO) EMP_RAISE(EMP_CODE, RAISE_AMOUNT, RAISE_DATE)		
P14	Create a transparent audit system for a table CLIENT_MASTER. The system must keep track of the records that are being deleted or updated. The functionality being when a record is deleted or modified the original record details and the date of operations is stored in the audit-client table, the delete or update is allowed to go through. Write a trigger for the above problem. The Tables are as follows:- CLIENT_MASTER(CLIENT_NO, NAME, ADDRESS, CITY, BAL-DUE) AUDIT_CLIENT(CLIENT_NO, NAME,BAL_DUE,OPERATION, USER_ID, OP_DATE)	10	3

h) Overall Course Attainment Target

Attainment Level	Inference	Marks
Attainment Level 1	40% of the students have attained more than the target level of that CO	1
Attainment Level 2	50% of the students have attained more than the target level of that CO	2
Attainment Level 3	60% of the students have attained more than the target level of that CO	3

(70% of university and 30% of the internal exam) will be = **Attainment Level 2**

Target has been set on the basis of last year's performance / result by the students, student quality this year and difficulty level of the course.

h) Mapping of Course Outcomes and Program Outcomes:

Course Outcomes	Program Outcomes (PO's)												PSOs	
	PO1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2
CS601.1	2	2	2	--	--	--	--	--	--	--	--	--	1	2
CS601.2	2	3	1	1	--	--	--	--	--	--	--	--	3	2
CS601.3	2	2	2	--	1	--	--	--	1	--	--	1	2	3
CS601.4	2	2	2	--	--	--	--	--	--	--	--	--	--	3
CS601.5	2	2	2	--	--	--	--	--	--	--	--	--	--	3
CS601	2	2	2	1	1	--	--	--	1	--	--	1	2	3

Justification for CO-PO Mapping

Mapping	Low(1) /Medium(2) /High(3)	Justification
CS601.1 – PO1	**2**	Use the **knowledge of the fundamental concepts** e.g. entity, attribute, relationship etc. to create conceptual schema.
CS601.1 – PO2	**2**	**Analyze** the requirements to decide entities, attributes, relationships among entities, relationship degree etc. using the first principles of *engineering sciences.*
CS601.1 – PO3	**2**	**Develop** relational database schema from ER schema in providing solutions to the real life data handling problems.
CS601.1 – PSO1	**1**	Apply mathematics (e.g. concepts of set theory in determining cardinality of a relationship) to create conceptual schema.
CS601.1 – PSO2	**2**	Use algorithms and data management schemes of various data models.
CS601.2 –PO1	**2**	Use the knowledge of **Mathematics** e.g. set theory, predicate calculus to express **queries** in **Relational Algebra** and **Relational Calculus.**
CS601.2 - PO2	**3**	**Identify** different techniques of procedural and non-procedural languages **to formulate** database queries for accessing the database.
CS601.2 - PO3	**1**	**Develop** optimum **queries** in procedural and non-procedural

		language constructs to **ease data access** from underlying database.
CS601.2 - PO4	**1**	**Optimize** the queries using query processing algorithms and catalog information to provide **least costly solutions to data access**.
CS601.2 - PSO1	**3**	Apply mathematics (e.g. concepts of set theory, predicate calculus) to formulate database queries in Relational algebra and relational calculus.
CS601.2 - PSO2	**2**	Use algorithms for query optimization and formulate optimized database queries for efficient data management.
CS601.3 - PO1	**2**	**Use the knowledge** of procedural and non-procedural languages to write database queries and programs.
CS601.3 - PO2	**2**	**Analyze and identify** specific database requirement that can be solved using PL/SQL.
CS601.3 - PO3	**2**	**Design** database queries using SQL to access data easily. Also acquire skills to develop solutions for complex problems using PL/SQL.
CS601.3 - PO5	**1**	Learning the basics of SQL helps in using modern tools available for database designing.
CS601.3 - PO9	**1**	Create and access database as an individual or as a member/leader in diverse teams.
CS601.3 - PO12	**1**	Gain the capability to **construct** database queries to create, access and maintain the database and to **adapt the technological changes.**
CS601.3 - PSO1	**2**	Apply concepts of set theory to formulate database queries and PL/SQL blocks to retrieve data with efficiency.
CS601.3 - PSO2	**3**	Acquire skills to design and manipulate database using SQL and/or PL/SQL.
CS601.4 - PO1	**2**	**Apply** the basic knowledge of normalization to design efficient database systems.
CS601.4 - PO2	**2**	**Identify** the issues relating to database insert, update, delete operations and **analyze** such issues to minimize them.
CS601.4 - PO3	**2**	**Develop** efficient database systems by applying normalization techniques.
CS601.4 - PSO2	**3**	Use algorithms and normalization techniques to normalize database ensuring no loss of information.
CS601.5 - PO1	**2**	**Use** concepts related to a transaction, concurrent schedules, and concurrency control techniques in order to ensure serializability of concurrent transactions**.**
CS601.5 - PO2	**2**	**Identify** different techniques of deadlock handling and **analyze** them to find out the situation when one technique is more practical than others in dealing with deadlock.

CS601.5 - PO3	**2**	**Design effective solution** to the issues of transaction processing and database failure to **provide data security** and also provide solution for concurrent transactions.
CS601.5 - PSO2	**3**	Use algorithms for data recovery and develop solutions for efficient transaction processing and data management.

i) Delivery Methodology:

Outcome	Method	Supporting Tools	Demonstration
CS 601.1	Structured (partially supervised Whole Class- grouping)	Blackboard & Chalk, Lecture Notes	Representation of any database system with ERD design.
CS 601.2	Structured (partially supervised Whole Class- grouping)	Blackboard & Chalk, Lecture Notes	Express a database query using mathematical notations of relational algebra and relational calculus.
CS 601.3	Structured (partially supervised Whole Class- grouping and independent work)	Blackboard & Chalk, Lecture Notes, SQL coding	Construct simple and nested queries on a given database system using SQL, and write PL/SQL programs.
CS 601.4	Structured (partially supervised Whole Class- grouping)	Blackboard & Chalk, Lecture Notes, SQL coding	Design normalized database and demonstrate data retrieval techniques.
CS 601.5	Structured (partially supervised Whole Class- grouping)	Blackboard & Chalk, Lecture Notes,	Demonstrate database transaction processing and recovery techniques.

j) Assessment Methodology:

Assessment Tool	Outcomes						Specific Question/activity aligned to the Outcome
	CS601.1	CS601.2	CS601.3	CS601.4	CS601.5		
FIRST INTERNAL	√	√	√	--	--		First Internal Question Paper
SECOND INTERNAL	--	--	√	√	√		Second Internal Question Paper
ASSIGNMENT	√	√	√	√	--		First, Second, Third, Fourth Assignment
QUIZ	√	√	√	√	√		Quiz –(Q1, Q2)
LABORATORY	--	--	√	√	--		LAB Assignments

k) A. Weekly Lesson Plan

Week	Lecture	Laboratory	Assignment/Quiz
1	Overview of DBMS, File & Database Concepts; 3 Schema architecture, Data Independence, Database Users, Database Administrator; Data Models, Introduction to E-R features e.g. entities, attributes, keys, cardinality	Introduction to SQL commands (P1, P2)	---
2	Extended E-R features e.g. Specialization, Generalization, Aggregation, ERD design for a database system, Integrity constraints, Introduction to RDBMS	Simple SQL queries (P3)	Assignment - I (A1)
3	Basic Relational Algebra operations	Table construction with integrity constraints (P4)	---
4	Extended Relational Algebra operations and Relational Calculus	Complex SQL queries (P5)	Assignment - II (A2)
5	Introduction to SQL queries: simple and nested queries	Design of normalized database (P6)	Assignment - III (A3)
6	SQL Query practice session, Views, Stored Procedures; Cursors, Triggers	Queries on normalized databases (P7)	Quiz – I (Q1)
7	Functional Dependency, closure of F , Cover of F	Nested SQL queries & Views (P8)	
8	Database normalization techniques: 1NF, 2NF, 3NF, BCNF	Complex SQL queries (P9, P10)	Assignment - IV (A4)
9	MVD & 4NF; JD & 5NF, Algorithm for Lossless join decomposition	Introduction to PL/SQL programming (P11)	---
10	Indexing techniques, B-tree & B+ tree, Hashing Techniques	PL/SQL stored procedures & functions (P12)	---
11	Transaction Concepts, Serializability, Concurrency control techniques, 2PL, time stamp protocol, deadlock	PL/SQL cursors (P13)	---
12	Recovery techniques: log based, non-log	PL/SQL triggers (P14)	Quiz – II (Q2)

	based, Query optimization techniques		

B. Daily Lesson Plan

CHAPTER: 1 Title: Introduction: Concepts and overview of DBMS Date: **2.2.17**, Day: **1**
CONTENTS Overview of DBMS, File & Database Concepts;
Chapter Objectives: They are capable to demonstrate relation between database and DBMS, differentiate between DBMS and file processing system **Broad Objectives of the chapter are:** 1. To able to relate database and DBMS. 2. To able to differentiate between DBMS and file processing system 3.
Once the student has completed this topic/ chapter he/she will be able to answer following questions/perform the following activities with Levels of Bloom's Taxonomy: 1. Define database and DBMS. (Level 1) 2. Compare DBMS and traditional file processing system. (Level 4) 3. Write some of the areas of applications of DBMS. (Level 2) 4.

CHAPTER: 1 Title: Introduction: Concepts and overview of DBMS Date: **6.2.17**, Day: **2**
CONTENTS 3 Schema architecture, Data Independence, Database Users, Database Administrator;
Chapter Objectives: They are capable to demonstrate 3 Schema architecture of DBMS, Data Independence, Differentiate among different database users

Broad Objectives of the chapter are:

1. To able to explain 3 Schema architecture of DBMS.
2. To able to differentiate among different database users.
3. To able to explain physical and logical data independence.
4. To able to explain the role of DBA.

Once the student has completed this topic/ chapter he/she will be able to answer following questions/perform the following activities with Levels of Bloom's Taxonomy:

1. Explain the 3-schema architecture of DBMS. (Level 2)
2. Explain data abstraction in DBMS.
3. Write the roles and responsibilities of DBA.
4. What do you mean by data independence?

CHAPTER: 2

Title: Entity-Relationship Model

Date: **7.2.17**, Day: **3**

CONTENTS

Data Models Basic Concepts, Cardinality Ratios;

Chapter Objectives: They are capable to demonstrate different data models, attributes, entities, keys

Broad Objectives of the chapter are:

1. They are able to explain different data models.
2. They are able to explain different types of attributes, entities, relationships.

Once the student has completed this topic/ chapter he/she will be able to answer following questions/perform the following activities with Levels of Bloom's Taxonomy:

1. Define: simple & composite attribute, single valued & multi-valued attribute, derived attribute. (Level 1)
2. Briefly explain different data models in DBMS. (Level 1)
3. Define: cardinality and degree of a relation. (Level 1)
4.

CHAPTER: 2

Title: Entity-Relationship Model

Date: **8.2.17**, Day: **4**

CONTENTS

Integrity Constraints, Keys;

Chapter Objectives: They are capable to demonstrate different data models.

Broad Objectives of the chapter are:

1. They are able to explain different types of keys.
2. They are able to explain different types of integrity constraints.

Once the student has completed this topic/ chapter he/she will be able to answer following questions/perform the following activities with Levels of Bloom's Taxonomy:

1. Define: super key, candidate key, primary key, alternate key, foreign key (Level 1)
2. Explain with suitable example: entity integrity constraint and referential constraint. (Level 2)
3.

CHAPTER: 2

Title: Entity-Relationship Model

Date: **9.2.17**, Day: **5**

CONTENTS

Strong Entity & Weak Entity Sets; ERD

Chapter Objectives: They are capable to explain Strong Entity & Weak Entity Sets and draw ERD for any database system.

Broad Objectives of the chapter are:

1. They are able to explain Strong Entity & Weak Entity Sets.
2. They are able to construct ERDs for a database system.
3.

Once the student has completed this topic/ chapter he/she will be able to answer following questions/perform the following activities with Levels of Bloom's Taxonomy:

1. Explain with suitable example the concept of weak entity set. (Level 2)
2. Define: Identifying relationship, discriminator. (Level 1)
3. Construct an ERD for a university database system. (Level 4)

HOME WORK:

1. Draw an ERD for a banking management system.
2. Draw an ERD for a car insurance company.
3.

CHAPTER: 2

Title: Entity-Relationship Model

Date: **13.2.17**, Day: **6**

CONTENTS

Specialization, Generalization, Aggregation

Chapter Objectives: They are capable to demonstrate the extended ER features,

Broad Objectives of the chapter are:

1. They are able to explain the concepts of Specialization, Generalization on ERD
2. They are able to explain the concepts of Aggregation
3.

Once the student has completed this topic/ chapter he/she will be able to answer following questions/perform the following activities with Levels of Bloom's Taxonomy:

1. Explain with suitable example the concepts of Specialization & Generalization on ERD. (Level 2)
2. What do you understand by the disjoint and overlapping constraint on specialization and generalization? (Level 2)
3. **Explain** aggregation with a suitable example. (Level 6)

CHAPTER: 2

Title: Entity-Relationship Model

Date: **14.2.17**, Day: **7**

Design of RDBMS from ERD

Chapter Objectives: They are capable to design relation schemas in RDBMS.

Broad Objectives of the chapter are:

1. They are able to convert ER features in RDBMS.
2.

Once the student has completed this topic/ chapter he/she will be able to answer following questions/perform the following activities with Levels of Bloom's Taxonomy:

1. How are multi-valued and composite attributes represented in RDBMS? (Level 2)
2. Represent weak entity set in RDBMS. (Level 2)
3. How are relationships in ER notations represented in RDBMS? (Level 2)

CHAPTER: 4

Title: SQL

Date: **15.2.17**, Day: **8**

CONTENTS

SQL: Basic Concepts, Set Operations; Query Practice

Chapter Objectives: They are capable to create and access a database

Broad Objectives of the chapter are:

1. They are able to create a database.
2. They are able to insert and update a database.
3. They are able to retrieve data from a database with help of SQL queries.

Once the student has completed this topic/ chapter he/she will be able to answer following questions/perform the following activities with Levels of Bloom's Taxonomy:

1. Write SQL queries to create and populates the following tables. (Level 1)

SUPPLIER (SUPPLIER _ID, SUPPLIER_NAME, SUPPLIER_ADDRESS)

PARTS (PART_ID, PART_NAME, COLOR)

CATALOG (SUPPLIER_ID, PART_ID, COST)

2. Write the following SQL queries based on the above mentioned tables: (Level 1)
   - Find names of the suppliers who supply both 'BLUE' and 'RED' parts.
   - Find names of the suppliers who supply either 'BLUE' or 'RED' parts.
   - Find names of the suppliers who supply 'BLUE' parts but not 'RED' parts.
   - Get the supplier who supply part id 'P2'.
   - Get name, color and cost of the parts supplied by supplier 'S4'.
   - Get the supplier name who supplies part 'P1'or 'P3'.
   - Get the supplier name who does not supply any part.
   - Get the supplier name who does not supply part 'P5'.
   -

HOME WORK:

1.

LABORATORY EXPERIMENT:

1.

CHAPTER: 4

Title: SQL

Date: 16.2.17, Day: 9

CONTENTS

SQL: Aggregate Functions, aliasing , self-join, Query Practice

Chapter Objectives: They are capable to access a database using SQL queries.

Broad Objectives of the chapter are:

1. They are able to retrieve data from a database with help of SQL queries.

Once the student has completed this topic/ chapter he/she will be able to answer following

questions/perform the following activities with Levels of Bloom's Taxonomy:

EMPLOYEE (EMP_CODE, EMP_NAME, DESIGNATION, HEAD, DOJ, BASIC, DEPT_CODE)

DEPARTMANT (DEPT_CODE, DEPT_NAME, LOCATION)

1. Write the following queries in SQL based on the above mentioned tables: (Level 1)
   - List the names of the employees who are earning more than the lowest salary of an employee in department 30.
   - List of only those DEPT_CODE where the total salary is greater than 20000.
   - List the names of those employees whose names either starts or ends with 'S'.
   - List the names of the employees along with the name of the people under whom they are working.
   - Get the maximum, minimum, average and total salary for each department.
   - Count the number of employees in each department with salary more than rupees 20000/-.
   - List the DOJ of the employees in 'DD/MM/YYYY' format.

HOME WORK:

2.

LABORATORY EXPERIMENT:

2.

CHAPTER: 4

Title: SQL

Date: 20.2.17, Day: 10

CONTENTS

SQL: Null Values; Nested Sub-Queries; Query Practice,

Chapter Objectives: They are capable to write nested queries in SQL.

Broad Objectives of the chapter are:

1. They are able to write nested queries in SQL.

Once the student has completed this topic/ chapter he/she will be able to answer following questions/perform the following activities with Levels of Bloom's Taxonomy:

1. Consider the following tables:

   SALES_ORDER_DETAILS (ORDER_NO, PRODUCT_NO, QTY_ORDERED, QTY_DISPATCHED)

   SALES_ORDER (ORDER_NO, CLIENT_NO, ORDER_DATE)

   CLIENT _MASTER (CLIENT_NO, NAME, BALANCE_DUE)

PRODUCT_MASTER (PRODUCT_NO, DESCRIPTION)

Write the following queries in SQL (Level 1)

a. Retrieve the PRODUCT_NO and the total QTY_ORDERED for products 'P001' and 'P004'.
b. Retrieve all orders placed by a client named 'RAHUL DESAI'.
c. Find out all products that are not being sold/ ordered.
d. Retrieve the ORDER_NO, client NAME, their ORDER_DATE in 'DD/MM/YY' format and sorted in ascending order of ORDER_DATE.

2. employee (employee name, street, city)
works (employee name, company name, salary)
company (company name, city)
manages (employee name, manager name)

Write the following queries in SQL (Level 1)

a. Find the names and cities of residence of all employees who work for First Bank Corporation.
b. Find the names, street addresses, and cities of residence of all employees who work for First Bank Corporation and earn more than $10,000.
c. Find all employees in the database who do not work for First Bank Corporation.
d. Find all employees in the database who earn more than each employee of Small Bank Corporation.
e. Find the company that has the most employees.
f. Find those companies whose employees earn a higher salary, on average, than the average salary at First Bank Corporation.

HOME WORK:

3.

LABORATORY EXPERIMENT:

3.

CHAPTER: 4

Title: **SQL**

Date: 21.2.17, Day: 11

CONTENTS

Assertions, Views

Chapter Objectives: They are capable to create assertions and views on database.

Broad Objectives of the chapter are:

1. They are able to write assertions.
2. They are able to create and update views.

Once the student has completed this topic/ chapter he/she will be able to answer following questions/perform the following activities with Levels of Bloom's Taxonomy:

1. What is view? (Level 1)
2. What are the advantages of creating a view? (Level 1)
3. Explain assertion with suitable example. (Level 2)
4. Create a table account and insert following data into the table Account.
5.

ACCOUNT NO.	BRANCH NAME	AMOUNT(RS)
A1	Kolkata	50,000
A2	Howrah	40,000
A3	Howrah	40,000
A4	Kolkata	20,000
A5	Durgapur	30,000

a) Create a view that will show branch name and total amount of that branch. The name of view will be acc_view.

b) Select the branch names having total amount greater than 50,000

i) Using account1 view

ii) Without using view.

LABORATORY EXPERIMENT:

1. Create a table account and insert following data into the table Account

ACCOUNT NO.	BRANCH NAME	AMOUNT(RS)
A1	Kolkata	50,000
A2	Howrah	40,000
A3	Howrah	40,000
A4	Kolkata	20,000
A5	Durgapur	30,000

a) Create a view that will show branch name and total amount of that branch. The name of view will be acc_view.

b) Select the branch names having total amount greater than 50,000

i) Using account1 view

ii) Without using view.

CHAPTER: 4

Title: **SQL**

Date: 22.2.17, Day: 12

CONTENTS

Stored Procedures;

Chapter Objectives: They are capable to create and execute stored procedures and function using PL/SQL.

Broad Objectives of the chapter are:

1. They are able to create and execute stored procedures.
2. They are able to create and execute stored functions.

Once the student has completed this topic/ chapter he/she will be able to answer following

questions/perform the following activities with Levels of Bloom's Taxonomy:

1. Write a PL/SQL function, which returns maximum of the three numbers. (Level 1)
2. Write a procedure to calculate sum of two numbers. (Level 1)
3. What are the differences between stored procedure and functions? (Level 1)
4.

LABORATORY EXPERIMENT:

Write a function, which returns true if employee non-exist in employee table otherwise it returns false. The Table is as follows: **EMPLOYEE (ENO, ENAME, SALARY, MGRNO)**

CHAPTER: 4

Title: **SQL**

Date: 23.2.17, Day: 13

CONTENTS

Cursors

Chapter Objectives: They are capable to create and execute stored explicit cursors using PL/SQL .

Broad Objectives of the chapter are:

1. They are able to create and execute cursors.
2.

Once the student has completed this topic/ chapter he/she will be able to answer following questions/perform the following activities with Levels of Bloom's Taxonomy:

1. What is cursor? (Level 1)

LABORATORY EXPERIMENT:

1. A HRD manager has decided to raise the salary for all the employees in department number 20 by 0.05. Whenever any such raise is given to employees an audit trail of the same is maintained in the **EMP_RAISE** table. The **EMP_RAISE** table holds the employee number, the date when the raise was given and the raise amount.

   Write a PL/SQL block to update the salary of each employee of dept-no 20 appropriately and insert a record in the **EMP_RAISE** table as well. (Level 1)
   Tables are as follows:
   EMPLOYEE (EMP_CODE, ENAME, JOB, SALARY. DEPTNO)
   EMP_RAISE(EMP_CODE, RAISE_AMOUNT, RAISE_DATE)

CHAPTER: 4

Title: **SQL**

Date: 27.2.17, Day: 14

CONTENTS

Triggers

Chapter Objectives: They are capable to create and execute stored explicit cursors using PL/SQL .

Broad Objectives of the chapter are:

1. They are able to create and execute database triggres.
2.

Once the student has completed this topic/ chapter he/she will be able to answer following questions/perform the following activities with Levels of Bloom's Taxonomy:

1. What is trigger? (Level 1)
2. The price of a product changes constantly. It is important to maintain the history of the prices of the products. Create a row trigger to insert the existing values of the 'PRODUCT' table into the 'PRODUCT_PRICE_HISTORY' table when the price of the product is updated in the 'PRODUCT' table. PRODUCT(product_id, product_name , supplier_name, unit_price)

LABORATORY EXPERIMENT:

Create a transparent audit system for a table **CLIENT_MASTER**. The system must keep track of the records that are being deleted or updated. The functionality being when a record is deleted or modified the original record details and the date of operations is stored in the audit-client table, the delete or update is allowed to go through.
Write a trigger for the above problem.

The Tables are as follows:-

CLIENT_MASTER (CLIENT_NO, NAME, ADDRESS, CITY, BAL-DUE)

AUDIT_CLIENT (CLIENT_NO, NAME, BAL_DUE, OPERATION,USER_ID,OP_DATE)

CHAPTER: 3

Title: Relational Model

Date: 1.3.17, Day: 15

CONTENTS

Basic Relational Algebra operations: selection, projection, rename, Cartesian product
Chapter Objectives: They are capable to explain basic mathematical operations for retrieving data from underlying database. **Broad Objectives of the chapter are:** 1. They are able to explain different unary and binary mathematical operations required to retrieve data from database. **2.**
Once the student has completed this topic/ chapter he/she will be able to answer following questions/perform the following activities with Levels of Bloom's Taxonomy: SUPPLIER (SUPPLIER _ID, SUPPLIER_NAME, SUPPLIER_ADDRESS) PARTS (PART_ID, PART_NAME, COLOR) CATALOG (SUPPLIER_ID, PART_ID, COST) Write the following queries in Relational Algebra based on above mentioned tables: (Level 1) 1. Get the supplier who supply part id 'P2'. 2. Get the suppliers who supply at least all those part supplied by supplier 'S2'. 3. Get the color of parts supplied by supplier 'S1'. 4. Find the parts that are supplied by at least two different suppliers. 5. Find names of the suppliers who supply 'YELLOW' parts. **6.**

CHAPTER: 3 Title: Relational Model **Date: 2.3.17, Day: 16**
CONTENTS Relational Algebra operations: set operations, join
Chapter Objectives: They are capable to explain basic mathematical operations for retrieving data from underlying database. **Broad Objectives of the chapter are:** 1. They are able to explain different set operations required to retrieve data from database. 2. They are able to join multiple tables and retrieve data in an efficient way **3.**
Once the student has completed this topic/ chapter he/she will be able to answer following questions/perform the following activities with Levels of Bloom's Taxonomy: SUPPLIER (SUPPLIER _ID, SUPPLIER_NAME, SUPPLIER_ADDRESS) PARTS (PART_ID, PART_NAME, COLOR) CATALOG (SUPPLIER_ID, PART_ID, COST)

1. Write the following queries in Relational Algebra based on above mentioned tables: (Level 1)
    - Get the name of the suppliers who supply at least one 'RED' part.
    - Find name of the supplier who supply all parts.
    - Get the supplier who do not supply part id 'P2'.
    - Find names of the suppliers who supply both 'BLUE' and 'RED' parts.
    - Find names of the suppliers who supply only 'RED' parts.
    - Find names of the suppliers who supply 'YELLOW' parts.
    - Get the supplier name who supplies part 'P1'or 'P3'.
    - Get the supplier name who does not supply any part.
    - Find names of the suppliers who supply 'BLUE' parts but not 'RED' parts.
2. Explain the difference between Cartesian product and natural join operation. (Level 2)
3. Compare between inner join and outer join. (Level 4)
4. Explain theta-join and equi-join. (Level 2)

CHAPTER: 3

Title: Relational Model

Date: 6.3.17, Day: 17

CONTENTS

Extended Relational Algebra Operations: division, generalized projection, aggregate functions

Chapter Objectives: They are capable to explain the extended relational algebra operations to retrieve data from a database.

Broad Objectives of the chapter are:

1. They are able to explain the use of division relational algebra operations.
2. They are able to use the aggregate functions to retrieve data
3.

Once the student has completed this topic/ chapter he/she will be able to answer following questions/perform the following activities with Levels of Bloom's Taxonomy:

SUPPLIER (SUPPLIER _ID, SUPPLIER_NAME, SUPPLIER_ADDRESS)

PARTS (PART_ID, PART_NAME, COLOR)

CATALOG (SUPPLIER_ID, PART_ID, COST)

1. Write the following queries in Relational Algebra based on above mentioned tables: (Level 1)
    - Find name of the supplier who supply all parts.
    - Find names of the suppliers who supply only 'RED' parts.
    - List the parts with maximum and minimum cost.
    - Get the average cost of each 'RED' part.
    - Get the number of distinct colored parts.
    - Get the total cost of the parts supplied by each supplier.
    - Retrieve the details of part id 'P2' having cost increased by 5%.

CHAPTER: 3 Title: Relational Model **Date: 7.3.17, Day: 18**
CONTENTS Relational Algebra Operations: Query practice
Chapter Objectives: They are capable to write queries using relational algebra operations. **Broad Objectives of the chapter are:** 1. They are able to write queries methodically. **2.**
Once the student has completed this topic/ chapter he/she will be able to answer following questions/perform the following activities with Levels of Bloom's Taxonomy: Consider the following tables: PROJECT (PROJECT_NO, PROJECT_NAME, PROJECT_MANAGER) EMPLOYEE (EMPLOYEE_NO, EMPLOYEE_NAME, SALARY) ASSIGNED_TO (PROJECT_NO, EMPLOYEE_NO) Write the following queries in **Relational Algebra:** i. List the name of employees working on project 'P1' but not on project 'P2'. ii. List the name of employees who are working on a project for which 'E1' is the project manager.

CHAPTER: 3 Title: Relational Model **Date: 8.3.17, Day: 19**
CONTENTS Relational Calculus
Chapter Objectives: They are capable to write queries using notations of relational calculus.

Broad Objectives of the chapter are:

1. They are able to write queries in tuple and domain relational calculus.
2.

Once the student has completed this topic/ chapter he/she will be able to answer following questions/perform the following activities with Levels of Bloom's Taxonomy:

EMPLOYEE (EMPLOYEE_NO, EMPLOYEE_NAME, CITY)

WORKS (EMPLOYEE_NO, COMPANY_NAME, SALARY)

1. Write the following query in both Tuple and Domain Relational Calculus. (Level 1)

- Find the name and city of residence of all employees who work for TCS Company.
- Find the name of all employees who earn more than rupees 20000/- per month.
- Find the name of the company for the employees of Bangalore city.
- Find the name of the employees who do not belong to Bangalore city.
-

CHAPTER: 3

Title: Relational Model

Date: 9.3.17, Day: 20

CONTENTS

Views , Modifications of the Database

Chapter Objectives: They are capable to explain the modification to database in a mathematical way.

Broad Objectives of the chapter are:

1. They are able to write views in relational algebra.
2. They are able to explain the insertion, deletion and updating of database using relational algebra operations.
3.

Once the student has completed this topic/ chapter he/she will be able to answer following questions/perform the following activities with Levels of Bloom's Taxonomy:

1. Write queries in relational algebra to insert update and delete records from the employee database. (Level 1)
   EMPLOYEE (SSN, EMP_NAME, ADDRESS, DATE_OF_JOIN, SALARY, DEPT)
2.

CHAPTER: 5

Title: Relational Database Design

Date: 13.3.17, Day: 21

CONTENTS

Functional Dependency, Armstrong's Axioms;

Chapter Objectives: They are capable to explain the concept of functional dependency among different attributes of a relation schema.

Broad Objectives of the chapter are:

1. They are able to explain the concept of functional dependency
2. They are able to demonstrate the Armstrong's Axioms

Once the student has completed this topic/ chapter he/she will be able to answer following questions/perform the following activities with Levels of Bloom's Taxonomy:

1. What do you understand by functional dependency? (level 2)
2. Write the Armstrong's Axioms.(Level 1)
3.

CHAPTER: 5

Title: Relational Database Design

Date: 14.3.17, Day: 22

CONTENTS

Closure of F, cover of F

Chapter Objectives: They are capable to find the closure and cover of a set of functional dependencies.

Broad Objectives of the chapter are:

1. They are able to find closure of a set of functional dependencies
2. They are able to find cover of a set of functional dependencies
3.

1.

Once the student has completed this topic/ chapter he/she will be able to answer following questions/perform the following activities with Levels of Bloom's Taxonomy:

1. Find the closure of the set of functional dependencies F. (Level 4)
   a. F= {A→BC, CD→E, B→D, E→A}

b. F= { AB→C, A→DE, B→F, F→GH, D→IJ}}

2. R= [A, B, C, D, E]
   F= {A→B, AB→C, D→AC, D→E}
   E= {A→BC, D→AE}
   Are F and E equivalent?

LABORATORY EXPERIMENT:

1. Create tables for following functional Dependencies –
   eno → { ename,address}
   pno → {pname, plocation}
   {eno,pno} → hours
   plocation must be among MUMBAI,KOLKATA,CHENNAI, and DELHI.
2. Mention primary key, foreign key and CHECK constraints.

CHAPTER: 5

Title: Relational Database Design

Date: 15.3.17, Day: 23

CONTENTS

Minimal cover / Canonical cover

Chapter Objectives: They are capable to find the minimal cover of a set of functional dependencies.

Broad Objectives of the chapter are:

1. They are able to find the minimal cover or the irreducible set of a set of functional dependencies.
2.

Once the student has completed this topic/ chapter he/she will be able to answer following questions/perform the following activities with Levels of Bloom's Taxonomy:

1. R= [A, B, C, D]
   F= {A→BC, B→C, A→B, AB→C, AC→D}
   Find whether F is irreducible. (Level 4)

2. R= [A, B, C]
   F= {A→BC, B→C, A→B, AB→C}
   Find the minimal cover of F. (Level 4)

CHAPTER: 5

Title: Relational Database Design

Date: 16**.3.17**, Day: 24

CONTENTS

Attribute closure , Normalization

Chapter Objectives: They are capable to design normalized database.

Broad Objectives of the chapter are:

1. They are able to find the key of a relation R with help of given FDs on R.
2. They are able to explain the insert update and delete anomalies on a database.
3. They are able to explain the need for database normalization.

Once the student has completed this topic/ chapter he/she will be able to answer following questions/perform the following activities with Levels of Bloom's Taxonomy:

1. Explain the need for database normalization. (Level 2)
2. Patient{patient_id, patient_name, appointment_no, time, doctor}
   F= {patient_id→patient_name, {patient_id, appointment_no} →time, doctor, time→ appointment_no}
   a. Find the key of the relation Patient. (Level 4)

CHAPTER: 5

Title: Relational Database Design

Date: 20.3.17, Day: 25

CONTENTS

1NF, 2NF, 3NF

Chapter Objectives: They are capable to design normalized database.

Broad Objectives of the chapter are:

4. They are able to normalize a relation in 1NF, 2NF, 3NF.

Once the student has completed this topic/ chapter he/she will be able to answer following questions/perform the following activities with Levels of Bloom's Taxonomy:

1. Define: full functional dependency, transitive dependency (Level 1)
2. Patient{patient_id, patient_name, appointment_no, time, doctor}
   F= {patient_id→patient_name, {patient_id, appointment_no} →time, doctor, time→ appointment_no}
   a. Find the key of the relation Patient.
   b. Normalize the relation Patient unto third normal form.
3. What do understand by repeating groups? How are they represented in a good database design? (Level 2)

CHAPTER: 5

Title: Relational Database Design

Date: 21.3.17, Day: 26

CONTENTS

BCNF; Problem discussion

Chapter Objectives: They are capable to design normalized database using the concepts of 1NF, 2NF, 3NF, BCNF;

Broad Objectives of the chapter are:

1. They are able to normalize a relation into BCNF.

Once the student has completed this topic/ chapter he/she will be able to answer following questions/perform the following activities with Levels of Bloom's Taxonomy:

1. Salesman_Order{order_id, order_date, customer_name, customer_address, salesman_name, salesman_address, item_code, item_name, quantity, rate}

   F= {salesman_name → salesman_address,
   customer_name→customer_address,
   order_id→ order_date, customer_name, salesman_name,
   order_id, , item_code → quantity
   item_code→item_name, rate}

   a. Find the key of the relation Salesman_Order. (Level 4)
   b. Normalize the relation Salesman_Order to its highest achievable normal form.

CHAPTER: 5

Title: Relational Database Design

Date: 22.3.17, Day: 27

CONTENTS

MVD & 4NF;

Chapter Objectives: They are capable to explain the concept of MVD and 4NF.

Broad Objectives of the chapter are:

1. They are able to demonstrate MVD and 4NF.

Once the student has completed this topic/ chapter he/she will be able to answer following questions/perform the following activities with Levels of Bloom's Taxonomy:

1. What do you understand by multivalued dependency? (Level 2)

2. Explain the concept of 4NF with example. (Level 2)

CHAPTER: 5 Title: Relational Database Design **Date: 23.3.17, Day: 28**
CONTENTS JD & 5NF, DKNF,
Chapter Objectives: They are capable to explain the concept of JD and 5NF and DKNF **Broad Objectives of the chapter are:** 1. They are able to demonstrate JD and 5NF.
Once the student has completed this topic/ chapter he/she will be able to answer following questions/perform the following activities with Levels of Bloom's Taxonomy: 1. What do you understand by join dependency? (Level 2) 2. Explain the concept of 5NF with example. (Level 2) 3. Explain domain key normal form. (Level 2)

CHAPTER: 5 Title: Relational Database Design **Date: 27.3.17, Day: 29**
CONTENTS Dependency preserving and Lossless join decomposition
Chapter Objectives: They are capable to demonstrate the dependency preserving and lossless join decomposition of a relation. **Broad Objectives of the chapter are:** 1. They are able to demonstrate dependency preserving decomposition. 2. They are able to demonstrate lossless join decomposition.
Once the student has completed this topic/ chapter he/she will be able to answer following questions/perform the following activities with Levels of Bloom's Taxonomy: 1. What do you understand by the dependency preserving decomposition? (Level 2) 2. Explain the concept of lossless join decomposition with suitable example. (Level 2) a) Consider a relation schema R(A, B,C, D, E, F) with set of functional dependencies F = {A→BCDEF, BC→ADEF,

B→F, D→E }.

v) Find the candidate keys for R. (Level 4)

vi) Decompose R to 3NF.

vii) If another functional dependency D→B is introduced, what will be the resulting decomposed relation schema?

3. Is the decomposition lossless ?

CHAPTER: 7

Title: File Organization & Index Structures

Date: 28**.3.17**, Day: 30

CONTENTS

Single Level Index(Primary, Clustered)

Topic/Unit/Chapter Objectives: They are capable to demonstrate the indexing techniques on RDBMS.

Broad Objectives of the chapter/topic are:

1. They are able to explain the concepts of sparse and dense indexing.
2. They are able to explain the concepts of primary and clustered indexing techniques.
3.

Once the student has completed this topic/ chapter he/she will be able to answer following questions/perform the following activities with Levels of Bloom's Taxonomy:

1. Compare between sparse and dense indexing techniques. (Level 4)
2. Explain with proper diagram: primary and clustered indexing techniques. (Level 2)

CHAPTER: 7

Title: File Organization & Index Structures

Date: 29**.3.17**, Day: 31

CONTENTS

Single Level Index(secondary index), Multi-level Indexes;

Topic/Unit/Chapter Objectives: They are capable to demonstrate the indexing techniques on RDBMS.

Broad Objectives of the chapter/topic are:

1. They are able to explain the concept of multi-level indexing.
2. They are able to explain the concepts of secondary indexing techniques.
3.

Once the student has completed this topic/ chapter he/she will be able to answer following questions/perform the following activities with Levels of Bloom's Taxonomy:

1. Compare between primary and secondary indexing techniques. (Level 4)
2. Explain with proper diagram: secondary indexing technique. (Level 2)
3. Explain the concept of multi-level indexing with suitable example. (Level 2)

CHAPTER: 7

Title: File Organization & Index Structures

Date: 30**.3.17**, Day: 32

CONTENTS

B-tree

Topic/Unit/Chapter Objectives: They are capable to construct a B-tree for a set of database records.

Broad Objectives of the chapter/topic are:

1. They are able to construct B-tree on set of records.
2.

Once the student has completed this topic/ chapter he/she will be able to answer following questions/perform the following activities with Levels of Bloom's Taxonomy:

1. What is B-tree? (Level 1)
2. Construct a B tree of order 3 for the following set of key values: (Level 4)
3. [5, 10, 15, 20, 35, 40, 50,65,70, 75,90, 95]
   i. Insert 60
   ii. Delete 15, 75
4.

CHAPTER: 7

Title: File Organization & Index Structures

Date: 3.4.17, Day: 33

CONTENTS

B^+ tree

Topic/Unit/Chapter Objectives: They are capable to construct a B^+ tree for a set of database records.

Broad Objectives of the chapter/topic are:

1. They are able to construct B^+ tree on set of records.
2.

Once the student has completed this topic/ chapter he/she will be able to answer following questions/perform the following activities with Levels of Bloom's Taxonomy:

1. What is B^+ tree? (Level 1)
2. Construct a B tree of order 3 for the following set of key values: (Level 4)
3. [5, 10, 15, 20, 35, 40, 50,65,70, 75,90, 95]
    i. Insert 60
    ii. Delete 15, 75
4. Compare between B tree and B^+ tree. (Level 4)

CHAPTER: 6

Title: Internals of RDBMS

Date: 4.4.17**, Day: 34**

CONTENTS

Transaction Concept, ACID Properties; Schedule

Topic/Unit/Chapter Objectives: They are capable to explain the concepts of database transaction

Broad Objectives of the chapter/topic are:

1. They are able to explain ACID properties of database transaction.
2. They are able to explain schedule of transactions.

Once the student has completed this topic/ chapter he/she will be able to answer following questions/perform the following activities with Levels of Bloom's Taxonomy:

1. Explain the ACID properties of transaction. (Level 2)
2. What do you understand by schedule of a set of transactions? (Level 2)
3. What is serial schedule? (Level 1)

CHAPTER: 6

Title: Internals of RDBMS

Date: 5.4.17**, Day: 35**

CONTENTS

Conflict & View Serializability,

Topic/Unit/Chapter Objectives: They are capable to explain the concepts of serializability among transactions.

Broad Objectives of the chapter/topic are:

1. They are able to explain concept of conflict serializability
2. They are able to explain concept of view serializability
3.

Once the student has completed this topic/ chapter he/she will be able to answer following

questions/perform the following activities with Levels of Bloom's Taxonomy:

4. When are two operations said to be conflicting? (Level 2)
5. Explain with example the concept of conflict serializability. (Level 2)
6. Explain with example the concept of view serializability. (Level 2)

CHAPTER: 6

Title: Internals of RDBMS

Date: 6.4.17**, Day: 36**

CONTENTS

Test for Conflict Serializability;

Topic/Unit/Chapter Objectives: They are capable to test the conflict serializability of a schedule.

Broad Objectives of the chapter/topic are:

1. They are able to test the conflict serializability of a schedule.

Once the student has completed this topic/ chapter he/she will be able to answer following questions/perform the following activities with Levels of Bloom's Taxonomy:

1. How do you test a schedule is conflict serializable or not?? (Level 2)
2. Find out whether the following schedule S is conflict or serial?
   S: [R3(y); R3(z); R1(x); W1(x); W3(z); W3(y); R2(z); R1(y); W1(y); R2(y); W2(y); R2(x); W2(x)]
   If conflict then, find the equivalent serial schedule. (Level 4)

CHAPTER: 6

Title: Internals of RDBMS

Date: 10.4.17**, Day: 37**

CONTENTS

Concurrency Control , Lock Base Protocols;

Topic/Unit/Chapter Objectives: They are capable to explain the need of concurrency control in a multi-user system

Broad Objectives of the chapter/topic are:

1. They are able to explain the need of concurrency control
2. They are able to demonstrate different lock based concurrency control protocols.

Once the student has completed this topic/ chapter he/she will be able to answer following

questions/perform the following activities with Levels of Bloom's Taxonomy:

1. Explain the need of concurrency control. (Level 2)
2. What is binary lock? What is the drawback of binary lock? (Level 1)
3. Explain shared and exclusive lock. (Level 2)
4.

CHAPTER: 6

Title: Internals of RDBMS

Date: 11.4.17**, Day: 38**

CONTENTS

Two Phase Locking, Deadlock,

Topic/Unit/Chapter Objectives: They are capable to demonstrate the concepts of 2PL and deadlock in a multi-user database system

Broad Objectives of the chapter/topic are:

1. They are able to explain the importance of 2PL.
2. They are able to explain deadlock in database system.

Once the student has completed this topic/ chapter he/she will be able to answer following questions/perform the following activities with Levels of Bloom's Taxonomy:

1. Describe two phase locking protocol. What are its limitations? (Level 2)
2. Explain strict 2PL and rigorous 2PL. (Level 2)
3. Explain with example: cascaded rollback. (Level 2)
4. What is a recoverable schedule? (Level 1)
5. What do you understand by deadlock in a database system? (Level 2)

CHAPTER: 6

Title: Internals of RDBMS

Date: 12.4.17**, Day: 39**

CONTENTS

Time stamp protocol

Topic/Unit/Chapter Objectives: They are capable to demonstrate the concepts of time stamp protocol for deadlock

Broad Objectives of the chapter/topic are:

1. They are able to explain the time stamp protocol

2.

Once the student has completed this topic/ chapter he/she will be able to answer following questions/perform the following activities with Levels of Bloom's Taxonomy:

1. Explain: 'deadlock cannot occur in time stamp base protocol'. (Level 2)
2. Explain the concept of wait-die and wound-wait protocol. (Level 2)
3. What is wait-for graph? (Level 1)
4.

CHAPTER: 6

Title: Internals of RDBMS

Date: 13.4.17**, Day: 40**

CONTENTS

Causes of Failure; Recovery Techniques: log based

Topic/Unit/Chapter Objectives: They are capable to explain the causes of database failure and recovery techniques.

Broad Objectives of the chapter/topic are:

1. They are able to explain the different causes of database failure.
2. They are able to demonstrate the log-based recovery technique
3.

Once the student has completed this topic/ chapter he/she will be able to answer following questions/perform the following activities with Levels of Bloom's Taxonomy:

1. What are the possible causes of database failure? (Level 1)
2. Explain the log-based recovery technique. (Level 2)
3. What are immediate update and deferred update? (Level 1)
4. What is log? (Level 1)

CHAPTER: 6

Title: Internals of RDBMS

Date: 17.4.17**, Day: 41**

CONTENTS

Recovery Techniques: checkpoints, shadow paging

Topic/Unit/Chapter Objectives: They are capable to explain the non-log-based recovery techniques

Broad Objectives of the chapter/topic are:

1. They are able to explain the concept of shadow paging.

2. They are able to describe the importance of checkpoints.

Once the student has completed this topic/ chapter he/she will be able to answer following questions/perform the following activities with Levels of Bloom's Taxonomy:

1. Explain the shadow paging technique of database recovery. What is its limitation? (Level 2)
2. Explain the importance of checkpoints in a database log. (Level 2)
3.

CHAPTER: 6

Title: Internals of RDBMS

Date: 18.4.17**, Day: 42**

CONTENTS

ARIES algorithm

Topic/Unit/Chapter Objectives: They are capable to explain the ARIES algorithm for database recovery

Broad Objectives of the chapter/topic are:

1. They are able to explain the ARIES algorithm.

Once the student has completed this topic/ chapter he/she will be able to answer following questions/perform the following activities with Levels of Bloom's Taxonomy:

1. Describe briefly the ARIES algorithm for database recovery. (Level 2)
2.

CHAPTER: 6

Title: Internals of RDBMS

Date: 19.4.17**, Day: 43**

CONTENTS

Query optimization: cost based optimization.

Topic/Unit/Chapter Objectives: They are capable to determine and write optimal queries

Broad Objectives of the chapter/topic are:

1. They are able to evaluate a query.
2. They are able to write optimal queries.

Once the student has completed this topic/ chapter he/she will be able to answer following questions/perform the following activities with Levels of Bloom's Taxonomy:

1. Describe the steps of query processing with the help of flow chart diagram. (Level 2)
2. What is operator tree? (Level 1)
3. Write the optimal query for the following: (Level 1)
   BOOK: { ISBN, BK_TITLE, A_ID, P_ID, PG_COUNT, CATEGORY, PRICE}
   PUBLISHER: { P_ID, P_NAME, ADDRESS, PH_NO, EMAIL, BOOKS_PUBLISHED}
   AUTHOR: { A_ID, A_NAME, ADDRESS, PH_NO, EMAIL, BOOKS_WRITTEN}
   REVIEW: {REVIEWER_ID, ISBN, RATING}

$\Pi_{BK\_TITLE, A\_NAME, RATING} (\sigma_{CATEGORY = 'NOVEL' \wedge RATING > 7} (BOOK \bowtie (REVIEW \bowtie AUTHOR))$

Title: **Discussion on University QP (Last 5 Years)**
Date: **24.4.17, 25.04.17** Day**: 44 & 45**

CONTENTS

Last 5 years university question paper.

Topic/Unit/Chapter Objectives: we provide discussion on university question paper so that our students can clear their concept and their answers can be to the point.

Broad Objectives of the chapter/topic are:

1. They are able to explain to analyze, investigate and evaluate.
2. They are able to judge how to apply theory.

Once the student has completed this topic/ chapter he/she will be able to answer following questions/perform the following activities with Levels of Bloom's Taxonomy:

Discussion most of the university questions in last 5 years.

l) Teaching Strategy/Method (describe instructional methods, usage of ICT, efficient and engaging instructions and display the best practices on institutional website)

1) Taking interactive classes through different examples.
2) Conducting Question – answer session at the end of the class.
3) Real life application for better understanding.

m) Strategy to support weak students

1) To engage the weak students in habit of studying, I give them some easy questions in regular basis.

2) Some weak students also have the problem of forgetting what they have learnt. In my class I always give some tips on how to recall and how to write systematically.
3) Weak students need special attention even after college hours. I always give some extra hours to weak students.

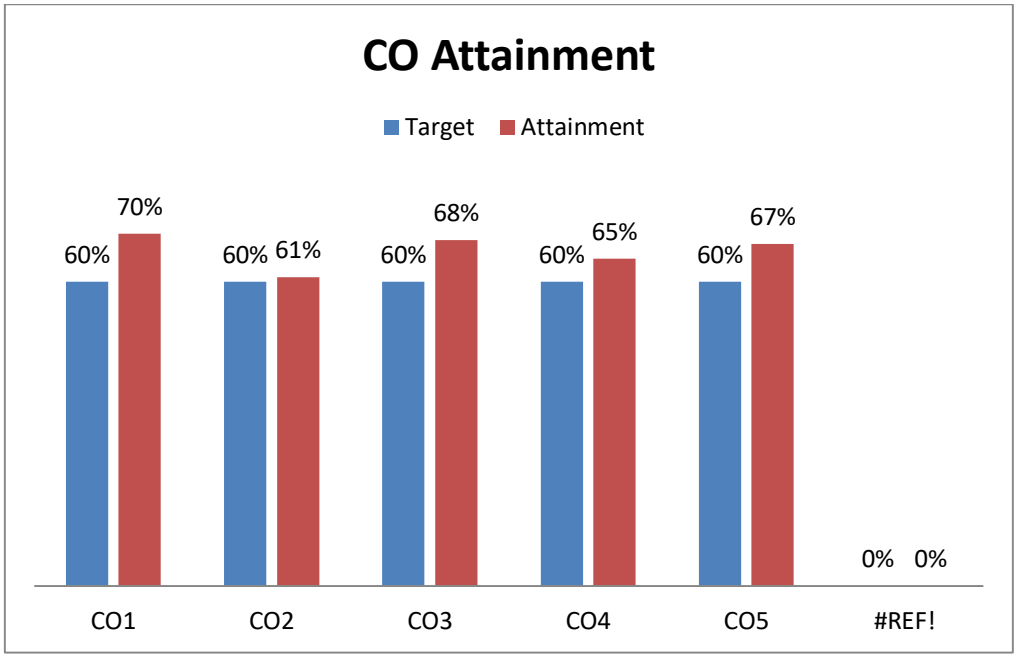
n) Strategy to encourage bright students

1) Have an extra challenge ready that allows the student to go deeper into the subject, learn a little more, or apply a skill he has just learned in a new way.
2) Some students are engaged with the final year students for their final projects.

o) Efforts to keep students engaged

1) Regular basis Home Work.
2) 5-10 minutes spent in an every class for question answer session.
3) Quiz on regular basis.
4) Some technical assignments are given group wise.

p) Analysis of Students performance in the course (internal) (labs, seminars, tests, assignments, quiz, exam etc)



Comments:

- 70% students have attained the set target of 60% marks for CO1
- 61% students have attained the set target of 60% marks for CO2
- 68% students have attained the set target of 60% marks for CO3
- 65% students have attained the set target of 60% marks for CO4
- 67% students have attained the set target of 60% marks for CO5

q) Analysis of Students performance in the course (university results)

	Target Course Outcome%	TOTAL STUDENTS	TOTAL STUDENT WHO ATTAINED OUTCOME	% STUDENTS WHO ATTAINED THE OUTCOME
University Result	**60%**	**41**	**35**	**85%**

- 85% students have attained the set target of 60% marks for University Exams.

r) Analysis of Student Feed Back

s) Teacher Self Assessment (at the completion of course)

From the analysis of the results obtained it can be seen that set targets for the course outcome have been achieved partially by the students. More emphasis should be given for Data Models, Relational Algebra and Calculus and Query Optimization Techniques.

t) Recommendations/Suggestions for improvement by faculty

- More emphasis should be given to clear the concepts of ERD concepts and Relational Algebra and Calculus.
- Tutorials must be incorporated in the syllabus.
- Increase the total contact hours for theory to 40 hrs, with 4L per week.

Siliguri Institute of Technology
INTERNAL ASSESSMENT REPORT
Paper Name: Database Management System
Paper Code: CS 601

FACULTY NAME : **Mrs. JAYASHREE SINGHA** **YEAR: 2017**

STREAM: **B.TECH[CSE]** YEAR: **3RD** SEMESTER: **2ND** SECTION: **B** NO. OF CLASS HELD: 43

SN	NAME	ROLL NO.	ATTENDANCE [5 MARKS]		MARKS IN INTERNAL EXAM			ASSIGNMENT/QUIZ [10 MARKS] MARKS=[((I+II)/30)*100]/10				TOTAL [30 MARKS]
			TOTAL %	MARKS	I	II	AVG	Q-I [15]	Q-II [15]	AVG	MARKS	
1	RAKESH KUMAR	11900114049	93	5	25	19	22	14	13	13.5	9	25
2	RISAB BISWAS	11900114050	91	5	27	25	26	12	11	11.5	7.7	26
3	RISHITA CHOWDHURY	11900114051	88	4	22	13	17.5	10	9	9.5	6.3	19
4	RIYA MITRA	11900114052	84	4	20	17	18.5	13	11	12	8	21
5	RUPAM MITRA	11900114053	79	3	8	10	9	10	6	8	5.3	13
6	SACHIN KUMAR SAHA	11900114054	79	3	11	9	10	9	13	11	7.3	15
7	SAGAR BHATTARAI	11900114055	86	4	13	10	11.5	9	8	8.5	5.7	15
8	SAGARIKA MITRA	11900114056	93	5	20	16	18	6	14	10	6.7	21
9	SAHITYA KAUSHIK	11900114057	91	5	24	17	20.5	13	11	12	8	23
10	SAMIK ANWAR	11900114058	91	5	23	11	17	13	12	12.5	8.3	22
11	SAMRAT BHATTACHARJEE	11900114059	76	3	4	10	7	8	10	9	6	13
12	SANDIPAN CHAKRABORTY	11900114060	76	3	10	10	10	10	11	10.5	7	15
13	SANGAM GURUNG	11900114061	86	4	13	11	12	14	8	11	7.3	17
14	SANTANU RAKSHIT	11900114062	79	3	14	10	12	11	9	10	6.7	16
15	SAPTARSHI GHOSH	11900114063	98	5	16	11	13.5	12	13	12.5	8.3	20

16	SAYAN CHAKRABORTY	11900114064	95	5	15	9	12	10	10	10	6.7	18
17	SHALINI PRADHAN	11900114065	91	5	16	17	16.5	12	9	10.5	7	20
18	SHALINI ROY CHOWDHURY	11900114066	79	3	13	12	12.5	10	8	9	6	15
19	SHASHI KANT PATEL	11900114067	84	4	16	17	16.5	11	12	11.5	7.7	20
20	SHIRSANA GHATAK	11900114068	81	4	14	19	16.5	9	11	10	6.7	19
21	SNEHA PARIJAAT	11900114069	93	5	16	26	21	11	12	11.5	7.7	23
22	SOHAM SARKAR	11900114070	84	4	16	23	19.5	7	9	8	5.3	19
23	SOURAVENDU NANDY	11900114071	79	3	8	14	11	10	9	9.5	6.3	15
24	SOUVIK BISWAS	11900114072	93	5	21	21	21	12	12	12	8	24
25	SRIJA GHOSH	11900114073	91	5	10	12	11	8	14	11	7.3	18
26	SUBHAM GUHA	11900114074	76	3	6	7	6.5	6	9	7.5	5	11
27	SUBHOJIT KUNDU	11900114075	84	4	18	16	17	10	9	9.5	6.3	19
28	SUDIPTA SAHA	11900114076	81	4	18	16	17	10	12	11	7.3	20
29	SURAJ SHARMA	11900114077	93	5	15	19	17	14	10	12	8	22
30	SURAJIT KUMAR DAS	11900114078	91	5	18	19	18.5	14	11	12.5	8.3	23
31	SWARNAVA MUKHERJEE	11900114079	98	5	16	18	17	14	10	12	8	22
32	SWEETY	11900114080	86	4	13	12	12.5	9	8	8.5	5.7	16
33	UJJAL DAS	11900114081	91	5	18	18	18	11	12	11.5	7.7	22
34	VINITA KUMARI	11900114082	84	4	12	7	9.5	12	6	9	6	15
35	ANIRBAN HALDAR	11900114086	81	4	3	11	7	8	5	6.5	4.3	12
36	ADRIJA PAUL	11900115095	84	4	19	25	22	10	8	9	6	21
37	BINDHYA MANGAR	11900115096	81	4	8	11	9.5	7	12	9.5	6.3	15
38	POOJA UPADHYAY	11900115097	88	4	15	18	16.5	14	8	11	7.3	20

39	RAJAT MUKHIA	11900115098	86	4	18	16	17	11	9	10	6.7	19
40	SHRADHANJALI PRADHAN	11900115099	81	4	8	8	8	7	9	8	5.3	13
41	RATNADEEP BHATTACHARYA	11900114048	79	3	11	11	11	8	7	7.5	5	14

SILIGURI INSTITUTE OF TECHNOLOGY

DEPARTMENT OF COMPUTER SCIENCE & ENGINEERING

1ST INTERNAL EXAM- 2017

PAPER NAME: DATABASE MANAGEMENT SYSTEM **PAPER CODE: CS 601**

FULL MARKS: 30 TIME: 1HR 30 MINS

Answer all questions (each question carries 10 marks)

Q1. Construct an E-R diagram for a company database that has to be designed to keep track of employees, departments and projects. The database should also be able to keep track of dependents of each employee for medical purpose. You can make appropriate assumptions to make the specification complete.
Convert E-R schema into relational schemas. **7 + 3**

OR

Describe the three-schema architecture. Why do we need mappings between schema levels?
What is the difference between logical data independence and physical data independence? Which one is harder to achieve? Why? **4+1+3+2**

OR

What do you mean by degree and cardinality of a relationship? Explain with suitable example specialization and generalization. Explain the terms super key and candidate key with example. **2+(2+2)+(2+2)**

Q2. Compare **left outer join**, **right outer join** and **full outer join** with example. **(2 + 2 + 2) + 2+ 2**

Consider following schemas –

Sailor (sid, sname, rating, age)
Reserve (sid, bid, day)

Give an expression in **Relational Algebra** for each of the following queries **:**

a. Find names of the sailors who have reserved boat number 203.
b. Find names and ages of the sailors who have reserved a boat.

OR

A. Consider the following schemas:
Employee (employee_no, employee_name, salary)
Project (project_no, project_name, project_manager)
Works_for (project_no, employee_no)
Write the following queries in **Relational Algebra:** **3+3**

i. List the name of employees working on project 'P2' but not on project 'P1'.
ii. List the name of employees who are working on a project for which 'E2' is the project manager.

B. Consider the following tables:

Employee (eno, fname, lname, dob, address, salary, dno)
Department (dnumber, dname)
Write the following query in both **Tuple and Domain Relational Calculus**: **2+2**

i. Find the name and address of all employees who work for the 'Sales' department.

Q3. Consider the following schemas:

Employee (employee_name, street, city)
Works (employee_name, company_name, salary)
Company (company_name, city)

Formulate the following queries in **SQL** **2+2+3+3**

a. Find the names and cities of residence of all employees who work for 'FBC'.
b. Find all employees who live in the same cities as the companies for which they work.
c. Assume that the companies may be located in several cities. Find all companies located in every city in which 'SBC' is located.
d. Find the company that has most employees.

Assignment -1 for 3rd year CSE 2017

Year: 3RD Semester: 2nd Section: A

Paper Name: Database Management System **FM:** 60

Paper Code: CS 601 **Submission Date:** 18/03/2016

1. Construct an E-R diagram for a Car-insurance company that has a set of customers, each of whom owns one or more cars. Each car has associated with it zero to any number of recorded accidents. Convert the E-R schema into Relational schema. (5)

2. Consider following relation schemas (7+7+7)
   Sailors(sid, sname, rating, age)
   Boats(bid, bname, color)
   Reserves(sid, bid, day)
   Write down following queries in RA, TRC and SQL expressions

   a) Find all sailors with rating above 7
   b) Find names and ages of sailors with rating above 7
   c) Find the sailor name, boat id and reservation date for each reservation
   d) Find the names of the sailors who have reserved boat number 103.
   e) Find the names of the sailors who have reserved a red boat.
   f) Find the names of the sailors who have reserved at least two boats.
   g) Find the names of the sailors who have reserved all boats.

3. Consider following two relation schemas:
   Employee (eno, ename, job, hiredate, managerno, salary, comm., dno)
   Dept (dno, dname, location)
   Solve the following queries using SQL: (5)

   i) List the name of the employees with their immediate higher authority.
   ii) List the name of the employee whose name either starts or ends with "S".
   iii) List the department name and the total salary payable in each department.
   iv) List out the employees who earn more than the average salary of their department.
   v) List the names of the employees who are working more than thirty years in the company.

4. Consider a relation schema R(A, B, C, D). For each of the following sets of FDs, assuming those are the only dependencies that hold on R, do the following: 5x3
   i) Identify the candidate key(s) for *R*.
   ii) Identify the best normal form that *R* satisfies (1NF, 2NF, 3NF, or BCNF).
   iii) If R is not in BCNF, decompose it into a set of BCNF relations that preserve the dependencies.

   1. $C \rightarrow D, C \rightarrow A, B \rightarrow C$
   2. $B \rightarrow C, D \rightarrow A$
   3. $ABC \rightarrow D, D \rightarrow A$
   4. $A \rightarrow B, BC \rightarrow D, A \rightarrow C$
   5. $AB \rightarrow C, AB \rightarrow D, C \rightarrow A, D \rightarrow B$

5. Prove that any relation schema with two attributes is in BCNF. (4)
6. Prove that every 3NF schema is in 2NF. (4)
7. Prove that a relation with primary key of single attribute is always in 2NF. (3)
8. Suppose schema R = (A,B,C,D,E) with F = { A → BC, CD → E, B → D, E → A} is decomposed into (A, B, C) and (A,D,E). Show that this decomposition is lossless-join decomposition. (3)

Siliguri Institute of Technology
LABORATORY ATTENDANCE SHEET
Paper Name: Database Management System
Paper Code: CS 691

FACULTY NAME : **Mrs. JAYASHREE SINGHA**

YEAR: 2017
NO. OF PRACTICAL HELD: 10

STREAM: **B.TECH[CSE]** YEAR: **3RD** SEMESTER: **2ND** GROUP: **B1**

SN	NAME	DAY	1	2	3	4	5	6	7	8	9	10	11	12	13	14	TOTAL MARKS
		DATE	6/2/17	13/2/17	20/2/17	27/2/17	6/3/17	27/3/17	10/4/17	17/4/17	8/5/17	15/5/17					
		ROLL NO															
1	RAKESH KUMAR	11900114049	0	1	1	1	1	0	1	1	1	1					8
2	RISAB BISWAS	11900114050	0	1	1	1	1	0	1	1	1	1					8
3	RISHITA CHOWDHURY	11900114051	1	1	1	1	1	0	1	1	1	1					9
4	RIYA MITRA	11900114052	0	1	1	1	1	1	1	0	1	1					8
5	RUPAM MITRA	11900114053	1	1	1	1	0	1	1	1	0	0					7
6	SACHIN KUMAR SAHA	11900114054	1	0	1	1	1	1	1	0	0	0					6
7	SAGAR BHATTARAI	11900114055	1	1	1	1	1	0	1	0	0	1					7
8	SAGARIKA MITRA	11900114056	1	1	1	1	1	0	1	0	1	1					8
9	SAHITYA KAUSHIK	11900114057	1	1	1	1	1	1	0	0	1	1					8
10	SAMIK ANWAR	11900114058	0	1	1	1	1	1	1	1	1	1					9
11	SAMRAT BHATTACHARJEE	11900114059	1	1	1	0	1	1	0	0	0	0					5
12	SANDIPAN CHAKRABORTY	11900114060	0	1	0	0	1	1	1	1	0	0					5
13	SANGAM GURUNG	11900114061	0	1	1	1	1	1	1	0	1	1					8
14	SANTANU RAKSHIT	11900114062	1	1	1	1	1	1	1	1	1	1					10

15	SAPTARSHI GHOSH	11900114063	1	1	1	1	1	1	1	1	1	1					10
16	SAYAN CHAKRABORTY	11900114064	1	1	1	1	1	1	0	0	1	1					8
17	SHALINI PRADHAN	11900114065	0	1	1	1	1	1	1	0	1	1					8
18	SHALINI ROY CHOWDHURY	11900114066	1	1	0	1	1	1	1	0	1	1					8
19	SHASHI KANT PATEL	11900114067	1	1	1	1	1	0	1	0	1	1					8
20	SHIRSANA GHATAK	11900114068	1	1	0	1	1	1	1	0	0	1					7

Siliguri Institute of Technology
LABORATORY ATTENDANCE SHEET
Paper Name: Database Management System
Paper Code: CS 691

FACULTY NAME : **Mrs. JAYASHREE SINGHA**

YEAR: 2017
NO. OF PRACTICAL HELD: 10

STREAM: **B.TECH[CSE]** YEAR: **3RD** SEMESTER: **2ND** GROUP: **B2**

SN	NAME	DAY	1	2	3	4	5	6	7	8	9	10	11	12	13	14	TOTAL MARKS
		DATE	8/2/17	15/2/17	22/2/17	1/3/17	8/3/17	29/3/17	12/4/17	19/4/17	28/4/17	12/5/17					
		ROLL NO															
1	SNEHA PARIJAAT	11900114069	0	1	1	1	1	1	1	1	0	1					8
2	SOHAM SARKAR	11900114070	0	1	1	1	1	1	0	1	1	1					8
3	SOURAVENDU NANDY	11900114071	1	0	1	1	1	1	0	1	1	1					8
4	SOUVIK BISWAS	11900114072	0	1	1	1	1	0	1	1	1	1					8
5	SRIJA GHOSH	11900114073	1	1	1	1	0	1	1	1	0	1					8
6	SUBHAM GUHA	11900114074	1	1	1	1	1	1	1	0	0	0					7

7	SUBHOJIT KUNDU	11900114075	1	0	1	1	1	1	0	1	1	0					7
8	SUDIPTA SAHA	11900114076	1	1	0	1	1	1	1	1	0	1					8
9	SURAJ SHARMA	11900114077	1	1	1	1	1	0	1	1	1	1					9
10	SURAJIT KUMAR DAS	11900114078	0	1	1	1	1	1	1	1	1	1					9
11	SWARNAVA MUKHERJEE	11900114079	0	1	1	1	1	1	1	1	0	1					8
12	SWEETY	11900114080	0	1	1	1	1	1	1	1	0	1					8
13	UJJAL DAS	11900114081	1	1	1	1	1	1	1	1	0	1					9
14	VINITA KUMARI	11900114082	1	1	1	1	1	0	0	1	1	0					7
15	ANIRBAN HALDAR	11900114086	1	0	1	0	1	1	0	0	1	1					6
16	ADRIJA PAUL	11900115095	1	1	1	1	1	1	0	1	0	1					8
17	BINDHYA MANGAR	11900115096	1	1	1	1	0	1	1	1	0	0					7
18	POOJA UPADHYAY	11900115097	1	1	1	1	1	1	0	0	1	1					8
19	RAJAT MUKHIA	11900115098	1	1	1	1	0	1	1	1	0	1					8
20	SHRADHANJALI PRADHAN	11900115099	1	1	1	1	1	1	0	1	0	1					8
21	RATNADEEP BHATTACHARYA	11900114048	0	1	1	1	1	1	0	1	1	1					8

Siliguri Institute of Technology
RECORDS OF ASSIGNMENTS/~~QUIZ~~
Paper Name: Database Management System
Paper Code: CS 601

SN	NAME	ROLL NO.	Assign - I	Assign - II	Assign - III	SN	NAME	ROLL NO.	Assign - I	Assign - II	Assign - III
1	RAKESH KUMAR	11900114049	1			21	SNEHA PARIJAAT	11900114069	1		
2	RISAB BISWAS	11900114050	1			22	SOHAM SARKAR	11900114070	1		
3	RISHITA CHOWDHURY	11900114051	1			23	SOURAVENDU NANDY	11900114071	1		
4	RIYA MITRA	11900114052	1			24	SOUVIK BISWAS	11900114072	1		
5	RUPAM MITRA	11900114053	1			25	SRIJA GHOSH	11900114073	1		
6	SACHIN KUMAR SAHA	11900114054	1			26	SUBHAM GUHA	11900114074	1		
7	SAGAR BHATTARAI	11900114055	1			27	SUBHOJIT KUNDU	11900114075	1		
8	SAGARIKA MITRA	11900114056	1			28	SUDIPTA SAHA	11900114076	1		
9	SAHITYA KAUSHIK	11900114057	1			29	SURAJ SHARMA	11900114077	1		
10	SAMIK ANWAR	11900114058	1			30	SURAJIT KUMAR DAS	11900114078	1		
11	SAMRAT BHATTACHARJEE	11900114059	1			31	SWARNAVA MUKHERJEE	11900114079	1		
12	SANDIPAN CHAKRABORTY	11900114060	1			32	SWEETY	11900114080	1		
13	SANGAM GURUNG	11900114061	1			33	UJJAL DAS	11900114081	1		
14	SANTANU RAKSHIT	11900114062	1			34	VINITA KUMARI	11900114082	1		
15	SAPTARSHI GHOSH	11900114063	1			35	ANIRBAN HALDAR	11900114086	1		
16	SAYAN CHAKRABORTY	11900114064	1			36	ADRIJA PAUL	11900115095	1		
17	SHALINI PRADHAN	11900114065	1			37	BINDHYA MANGAR	11900115096	1		
18	SHALINI ROY CHOWDHURY	11900114066	1			38	POOJA UPADHYAY	11900115097	1		

19	SHASHI KANT PATEL	11900114067	1			39	RAJAT MUKHIA	11900115098	1		
20	SHIRSANA GHATAK	11900114068	1			40	SHRADHANJALI PRADHAN	11900115099	1		
						41	RATNADEEP BHATTACHARYA	11900114048	1		

Siliguri Institute of Technology
LIST OF PRACTICAL'S
Paper Name: Database Management System Lab
Paper Code: CS 691

Sl No.	Details of Experiments	Hours Allotted
P1	Q1. a) Create a table 'STUDENT' with following structures:- Col. Name Type Width ROLL NUMBER 2 NAME VARCHAR2 15 EXAMDATE DATE f) Add a primary key constraint on column 'NAME'. g) Drop the primary key of the table 'STUDENT'. h) Add a primary key on col. 'ROLL' in table 'STUDENT'. i) Insert following data:- **ROLL NAME EXAMDATE** 11 Sourav 01-JUN-10 12 Kamal 01-JUN-10 13 Rahul 01-JUN-10 14 Sovan 01-DEC-10 15 Shyamal 01-DEC-10	1
P2	Q2. a) Create a table 'MARKS' with following structures:- Col. Name Type Width ROLL NUMBER 2 MATH NUMBER 2 ENG NUMBER 3 **b)** Add a foreign key constraint on column 'ROLL' in 'MARKS' table referencing column 'ROLL' in table 'STUDENT' and name the constraint as FK_ROLL. c**)** Change width of 'MATH' column to 3.	1

	d) Add a check constraint on 'ENG' column so that permissible value for 'ENG' attribute lies between 0 and 50 and name the constraint as CHK_ENG. **e)** Try to insert following data:- <11,90,80> **f)** Now insert following data: ROLL MATH ENG 11 90 45 12 45 46 13 70 30 14 90 20 15 45 46 **g)** Add a new column 'TOTAL' in table 'MARKS'. The data type is number and width is 3. **h)** Update column 'TOTAL' in 'MARKS' table with proper data.	
P3	**i)** Display data from table 'STUDENT' with column heading ROLL_NO, STD_NAME. **j)** List students having name starting with letter 'S'. **k)** List students where second character of name is 'a'. **l)** Display EXAMDATE in 'DD/MM/YYYY' format. **m)** Display NAME, MATH, ENG and PER of all students. Assume, total marks of math are 100 and eng is 50. **n)** Display names of all students who are getting above 65 of math. **o)** Display names of students getting marks in eng between 20 and 40. **p)** Display name of the student, who get the same marks (math) as that of 'Shyamal'.	1
P4	HOTEL (HOTEL_NO, NAME, ADDRESS) ROOM(ROOM_NO, HOTEL_NO, TYPE, PRICE) BOOKING(HOTEL_NO, GUEST_NO, DATE_FROM, DATE_TO, ROOM_NO) GUEST(GUEST_NO, NAME, ADDRESS) Where HOTEL contains hotel details and HOTEL_NO is the Primary Key. ROOM contains room details for each hotel and (HOTEL_NO,ROOM_NO) forms the Primary key. BOOKING contains details of the bookings and the Primary Key comprises (HOTEL_NO, GUEST_NO, DATE_FORM) and GUEST contains guest details and GUEST_NO is the Primary key and mention the Foreign Key constraints.	1.5
P5	ix. List full details of hotels in Mumbai x. List the name and addresses of all guests in New Delhi, alphabetically ordered by the name. xi. List all double or family rooms with a price below Rs. 800 per day, in ascending ordered.	1.5

	xii. List the bookings for which no date_to has been specified. xiii. What is the total daily revenue from all the double room? xiv. How many different guests have made booking for august, 2015 xv. List the price and type of all rooms at the hotel Land Mark. xvi. What is the total income from booking for the hotel Manor today.	
P6	**1.a)** Create tables for following functional Dependencies – eno → { ename,address} pno → {pname, plocation} {eno,pno} → hours plocation must be among MUMBAI,KOLKATA,CHENNAI, and DELHI. **b)** Mention primary key, foreign key and CHECK constraints. **c)** i. Insert following data for EMP:- **ENO ENAME ADDRESS** 1 Swarnali MUMBAI 2 Deboshree MUMBAI 3 Moumita KOLKATA 4 Piyali CHENNAI 5 Surupa DELHI **ii.** Insert following data for Proj:- ***PNO PNAME PLOCATION*** 101 BANKING DELHI 102 LIBRARY MUMBAI 103 RAILWAY KOLKATA 104 FINANCE CHENNAI 105 ANALYZER DELHI **iii.** Insert following data for EmpProj:- **ENO PNNO HOURS** 1 101 10 2 103 12 3 104 19 3 105 29 5 102 6 **d)** List the name of employees who are working on more than one project	2
P7	**2.a)** Create a table PHONE_BOOK. The fields of the table are NAME, ADRESS, PHONE_NO. **b)** Insert at least 6 entries into the table of which there are two pairs of duplicate entries. **c)** Delete duplicate rows from the table. **d)** Write a query to select first two rows from the table. **e)** Write a query to select last two rows from the table.	1
P8	**3.a)** Create a table employee and insert following data nto the table. EMPNO EMPNAME MANAGERNO SALARY E1 Amal -- 30,000 E2 Bimal E1 25,000 E3 Kamal E1 20,000 E4 Nirmal E2 15,000	3

	E5 Shymal E2 21,000 E6 Parimal E3 10,000 **b)** Retrieve the names of the employees and the names of their respective managers from the employee table. **c)** Retrieve the name of the employee who is earning second maximum salary. **d)** Retrieve the name of the employee who is earning nth highest salary. **e)** Retrieve the names of employees whose salary is greater than the salary of all the employees whose manager no. is E1. **f)** Get the details of all employees whose salary is lesser than the average salary of the employee.	
P9	**4.a)** Create a table account and insert following data into the table Account. ACCOUNTNO BRANCHNAME AMOUNT A1 Kolkata 50000 A2 Howrah 40000 A3 Howrah 40000 A4 Kolkata 20000 A5 Durgapur 30000 **b)** Create a view that will show branch name and total amount of that branch. The name of view will be acc_view. **c)** Select the branch names having total amount greater than 50,000 i) Using account1 view ii) Without using view. **5.a)** Create a table Marks and insert following data into the table. STUDENTNAME SUBJECT NAME MARKS Amit DBMS 80 Amit OS 70 Bimal DBMS 70 Bimal OS 70 **b)** Retrieve the name of the students who are getting marks in DBMS above 75 but who are getting marks in OS less than 75. **c)** Write a query to retrieve student names from the marks table and output will look like:- Mr. A Mr. A Mr. B Mr. B	3
P10	6.Create a unique index on ENO column of the table EMP. 7.The table Sales_Order_Detail(Product_No, Suppliers_No, Order_ID) has more 50,000 records for 500 distinct Product. Create an index on the Product_No column, which is the best suited according to the above stated scenario.	3

8.Create the following object type rectangle with the attributes length, width and a method area (), which computes the area of the rectangle; as follows.

```
CREATE TYPE rectangle AS OBJECT
( length   NUMBER,
  width    NUMBER,
  MEMBER FUNCTION area RETURN NUMBER
  DETERMINISTIC
);
/
CREATE OR REPLACE TYPE BODY rectangle AS
  MEMBER FUNCTION area RETURN NUMBER IS
BEGIN
RETURN (length*width);
END;
/
```

Now, create a table rect_tab of type rectangle and create a function-based index on the method area().

9.Make a group of 5 students. Open two terminals. From one terminal Login into the Oracle server with the user name FACULTY and password FACULTY. (This user has the ***CREATE USER*** system privilege. From the other terminal do the experiments with the newly created user.

g. Create a user **STUDENT** with following characteristics
   1. The password student123
   2. Default tablespace **SYSTEM**, with a quota of 10 megabytes
   3. Temporary tablespace **TEMP**
   4. Access to the tablespace **SYSTEM**, with a quota of 5MB.
   5. Limits on database resources defined by the profile **DEFAULT**

h. After successfully creating this user, try to connect using this username and password. Note the error message and state the reason.

i. Grant the role Connect to the user with admin option.

j. Grant Resource and other necessary system privileges to this user. (e.g. Alter, Create, Insert, Delete, Grant etc.)

k. Now Create the Table Employee(Eno Number(2), EName Varchar2(15)).

l. Insert 3 records. Try different DML operations.

10.a. Log in as CSEA (User ID: CSEA, Password: CSEA).

	Display all records from the Employee table of the user Student. Try to insert or update any record. Note down the error. b. Grant the object privileges on the table STUDENT.EMPLOYEE to CSEA with without Grant option. c. Now do the experiments given in 2a. d. Log in as CSEA. Try to grant the object Privilege on STUDENT.EMPLOYEE to the user CSEB. Note down the error. How this can possible.	
P11	Write a PL/SQL program to check the given number is even or odd. Write a program to check whether a given number is prime or not. Write a PL/SQL program to check whether a number is Armstrong number or not.	3
P12	a) Write a procedure to calculate sum of two numbers. b) Write a PL/SQL function, which returns maximum of the three numbers. c) Write a function, which returns true if employee exist in employee table, otherwise it returns false. The Table is as follows: EMPLOYEE (ENO, ENAME, SALARY, MGRNO)	3
P13	a) Write a PL/SQL code block to calculate the area of a circle for a value of radius varying from 3 to 7. Store the radius and the corresponding values of calculated areas in table. b) Add an extra column diameter to the table circle and update the diameter column for each entry diameter=2* radius. c) Print the number of records in the circle table with the help of an explicit cursor. a)A HRD manager has decided to raise the salary for all the employees in department number 20 by 0.05. Whenever any such raise is given to employees an audit trail of the same is maintained in the **EMP_RAISE** table. The **EMP_RAISE** table holds the employee number, the date when the raise was given and the raise amount. b) Write a PL/SQL block to update the salary of each employee of dept-no 20 appropriately and insert a record in the **EMP_RAISE** table as well. Tables are as follows: EMPLOYEE (EMP_CODE, ENAME, JOB, SALARY. DEPTNO) EMP_RAISE(EMP_CODE, RAISE_AMOUNT, RAISE_DATE)	3
P14	Create a transparent audit system for a table CLIENT_MASTER. The system must keep track of the records that are being deleted or updated. The functionality being when a record is deleted or modified	3

	the original record details and the date of operations is stored in the audit-client table, the delete or update is allowed to go through. Write a trigger for the above problem. The Tables are as follows:- CLIENT_MASTER(CLIENT_NO, NAME, ADDRESS, CITY, BAL-DUE) AUDIT_CLIENT(CLIENT_NO, NAME,BAL_DUE,OPERATION, USER_ID, OP_DATE)	

Siliguri Institute of Technology
SESSIONAL/PRACTICAL PERFORMANCE RECORD
Paper Name: Database Management System Lab
Paper Code: CS 691

FACULTY NAME : **Mrs. Jayashree Singha** **YEAR: 2017**

STREAM: **B.TECH[CSE]** YEAR: **3RD** SEMESTER: **2nd** SECTION: **B**

SN	NAME	ROLL NO	P1	P2	P3	P4	P5	P6	P7	P8	P9	P10	P11	P12	P13	P14	TOTAL[40]
1	RAKESH KUMAR	11900114049	3	3	3	2	3	3	2	3	2	3	**3**	2	**2**	**2**	**36**
2	RISAB BISWAS	11900114050	3	3	3	3	3	3	3	3	2	3	**3**	2	**3**	**3**	**40**
3	RISHITA CHOWDHURY	11900114051	3	3	3	3	2	3	3	2	2	3	**2**	2	**2**	**2**	**35**
4	RIYA MITRA	11900114052	3	3	3	3	3	3	2	2	1	2	**2**	2	**3**	**3**	**35**
5	RUPAM MITRA	11900114053	3	3	2	2	2	3	2	2	2	1	**2**	1	**1**	**1**	**27**
6	SACHIN KUMAR SAHA	11900114054	3	3	2	3	2	3	2	2	2	3	**3**	1	**2**	**2**	**33**
7	SAGAR BHATTARAI	11900114055	3	3	3	3	3	3	2	2	1	2	**3**	2	**3**	**3**	**36**
8	SAGARIKA MITRA	11900114056	3	3	3	3	2	3	3	2	2	3	**3**	2	**2**	**3**	**37**
9	SAHITYA KAUSHIK	11900114057	3	3	3	3	3	2	3	3	2	3	**2**	2	**3**	**3**	**38**
10	SAMIK ANWAR	11900114058	3	3	3	3	3	3	3	3	2	3	**3**	2	**3**	**3**	**40**
11	SAMRAT	11900114059	3	3	2	2	3	3	3	3	2	2	**2**	1	**1**	**1**	**31**

	BHATTACHARJEE																
12	SANDIPAN CHAKRABORTY	11900114060	3	3	3	1	1	1	1	1	1	1	**1**	1	**1**	**1**	**20**
13	SANGAM GURUNG	11900114061	3	3	3	2	3	3	2	2	2	2	**3**	2	**1**	**1**	**32**
14	SANTANU RAKSHIT	11900114062	3	3	2	2	2	2	2	2	2	3	**3**	2	**2**	**2**	**32**
15	SAPTARSHI GHOSH	11900114063	3	3	2	3	2	2	2	2	2	2	**2**	1	**2**	**2**	**30**
16	SAYAN CHAKRABORTY	11900114064	2	2	2	2	3	3	3	3	2	3	**3**	1	**1**	**1**	**31**
17	SHALINI PRADHAN	11900114065	3	3	3	3	3	3	2	2	1	2	**2**	2	**3**	**3**	**35**
18	SHALINI ROY CHOWDHURY	11900114066	3	3	3	3	2	3	3	2	2	3	**3**	2	**2**	**3**	**37**
19	SHASHI KANT PATEL	11900114067	3	3	2	2	3	3	3	3	2	3	**2**	2	**1**	**1**	**33**
20	SHIRSANA GHATAK	11900114068	3	3	2	3	2	2	2	2	2	3	**3**	2	**2**	**1**	**32**
21	SNEHA PARIJAAT	11900114069	3	3	3	2	3	3	2	2	2	2	**3**	2	**3**	**3**	**36**
22	SOHAM SARKAR	11900114070	3	3	3	3	2	3	3	2	2	3	**3**	2	**3**	**3**	**38**
23	SOURAVENDU NANDY	11900114071	3	3	3	2	3	3	1	2	1	2	**3**	3	**3**	**3**	**35**
24	SOUVIK BISWAS	11900114072	3	3	3	3	2	3	3	2	2	3	**3**	2	**2**	**3**	**37**
25	SRIJA GHOSH	11900114073	3	2	3	2	3	2	3	2	2	3	**2**	2	**1**	**2**	**32**
26	SUBHAM GUHA	11900114074	3	3	3	2	2	1	2	2	1	2	**2**	2	**1**	**2**	**28**
27	SUBHOJIT KUNDU	11900114075	3	3	3	3	2	3	3	2	2	3	**2**	2	**2**	**3**	**36**
28	SUDIPTA SAHA	11900114076	2	2	3	2	3	2	3	3	2	3	**2**	2	**2**	**2**	**33**
29	SURAJ SHARMA	11900114077	3	3	3	3	2	3	3	3	2	3	**3**	2	**2**	**3**	**38**
30	SURAJIT KUMAR DAS	11900114078	3	3	3	3	3	3	3	3	2	3	**3**	2	**3**	**3**	**40**
31	SWARNAVA MUKHERJEE	11900114079	3	3	3	3	3	3	3	3	2	3	**3**	2	**3**	**3**	**40**

32	SWEETY	11900114080	3	3	2	3	3	2	2	2	2	2	**3**	2	**2**	**2**	**33**
33	UJJAL DAS	11900114081	3	3	3	2	2	3	3	2	2	3	**3**	2	**2**	**2**	**35**
34	VINITA KUMARI	11900114082	3	3	2	2	2	2	2	2	2	2	**2**	**2**	**2**	**1**	**29**
35	ANIRBAN HALDAR	11900114086	3	2	2	3	2	2	2	2	2	2	**2**	**2**	**2**	**2**	**30**
36	ADRIJA PAUL	11900115095	2	2	2	3	3	2	3	3	2	3	**3**	**2**	**3**	**3**	**36**
37	BINDHYA MANGAR	11900115096	2	2	1	2	1	2	2	2	2	2	**2**	**2**	**2**	**2**	**26**
38	POOJA UPADHYAY	11900115097	3	3	2	3	2	2	2	2	2	2	**3**	**2**	**2**	**2**	**32**
39	RAJAT MUKHIA	11900115098	3	3	2	3	2	3	3	2	2	2	**3**	**2**	**2**	**3**	**35**
40	SHRADHANJALI PRADHAN	11900115099	2	2	2	2	2	2	2	2	2	2	**2**	**2**	**2**	**1**	**27**
41	RATNADEEP BHATTACHARYA	11900114048	2	2	2	2	2	3	2	2	2	1	**2**	**1**	**1**	**1**	**25**

NAME WITH ROLL NUMBERS OF STUDENT WHOSE ACADEMIC PERFORMANCE IS NOT SATISFACTORY			
Sl.	**Name of Student**	**Roll No.**	**Remedial measures taken by teacher**
1	RUPAM MITRA	11900114053	• Additional doubt clearing sessions • Highlighting important and frequently asked questions
2	SAMRAT BHATTACHARJEE	11900114059	
3	SAPTARSHI GHOSH	11900114063	
4	SAYAN CHAKRABORTY	11900114064	
5	BINDHYA MANGAR	11900115096	
6	SHRADHANJALI PRADHAN	11900115099	
7	RATNADEEP BHATTACHARYA	11900114048	
8			
9			
10			
11			

CERTIFICATE

I, the undersigned, have completed the course allotted to me as shown below

Sl. No.	Semester	Subject with Code	Total Chapters	Remarks
1.	6th	Database Management System (CS601) Database Management System Laboratory (CS 691)	7	

Date :	**Signature of Faculty**

Submitted to HOD
Certificate by HOD
I, the undersigned, certify that **Prof. Jayashree Singha** has completed the course work allotted to him satisfactorily / not satisfactorily.

Date :	**Signature of HOD**

Submitted to Director

Date :	**Signature of Director**

SILIGURI INSTITUTE OF TECHNOLOGY

DEPARTMENT OF COMPUTER SCIENCE & ENGINEERING

1ST INTERNAL EXAM- 2017

PAPER NAME: DATABASE MANAGEMENT SYSTEM **PAPER CODE: CS 601**

FULL MARKS: 30 TIME: 1HR 30 MINS

Answer all questions (each question carries 10 marks)

Q4. Construct an E-R diagram for a company database that has to be designed to keep track of employees, departments and projects. The database should also be able to keep track of dependents of each employee for medical purpose. You can make appropriate assumptions to make the specification complete.
Convert E-R schema into relational schemas. **7 + 3**

OR

Describe the three-schema architecture. Why do we need mappings between schema levels?
What is the difference between logical data independence and physical data independence? Which one is harder to achieve? Why? **4+1+3+2**

OR

What do you mean by degree and cardinality of a relationship? Explain with suitable example specialization and generalization. Explain the terms super key and candidate key with example. **2+(2+2)+(2+2)**

Q5. Compare **left outer join**, **right outer join** and **full outer join** with example. **(2 + 2 + 2) + 2+ 2**

Consider following schemas –

Sailor (sid, sname, rating, age)
Reserve (sid, bid, day)

Give an expression in **Relational Algebra** for each of the following queries **:**

c. Find names of the sailors who have reserved boat number 203.
d. Find names and ages of the sailors who have reserved a boat.

OR

C. Consider the following schemas:
Employee (employee_no, employee_name, salary)
Project (project_no, project_name, project_manager)
Works_for (project_no, employee_no)
Write the following queries in **Relational Algebra:** **3+3**

iii. List the name of employees working on project 'P2' but not on project 'P1'.
iv. List the name of employees who are working on a project for which 'E2' is the project manager.

D. Consider the following tables:
Employee (eno, fname, lname, dob, address, salary, dno)
Department (dnumber, dname)
Write the following query in both **Tuple and Domain Relational Calculus**: **2+2**

ii. Find the name and address of all employees who work for the 'Sales' department.

Q6. Consider the following schemas:

Employee (employee_name, street, city)
Works (employee_name, company_name, salary)
Company (company_name, city)

Formulate the following queries in **SQL** **2+2+3+3**

a. Find the names and cities of residence of all employees who work for 'FBC'.
b. Find all employees who live in the same cities as the companies for which they work.
c. Assume that the companies may be located in several cities. Find all companies located in every city in which 'SBC' is located.
d. Find the company that has most employees.

SILIGURI INSTITUTE OF TECHNOLOGY

DEPARTMENT OF COMPUTER SCIENCE & ENGINEERING

2nd INTERNAL EXAM- 2017

PAPER NAME: DATABASE MANAGEMENT SYSTEM **PAPER CODE: CS 601**

FULL MARKS: 30 TIME: 1HR 30 MINS

Answer any one question form each group, each question carries 10 marks

Group- A (CO4)

a) Define multi-value dependency with suitable example.
b) Compute the closure of the following set of functional dependencies for the relation schema R.
R={A, B, C, D, E); F={A→BC, CD→E,B→D,E→A}
c) Consider the relation schema R(A, B, C) with a set of functional dependencies
F={A→BC, B→C, A→B, AB→C}. Compute the irreducible set for F. 3+3+4

OR

a) Consider a relation schema R(A, B, C, D, E, F) with a set of functional dependencies
F={A→BCDEF, BC→ADEF, B→F, D→E}.
I) Find the candidate keys for R.
II) Decompose r into 3NF.
III) If another functional dependency R is introduced, what will be the resulting decomposed relation schema?
IV) Is the decomposition lossless? 2+4+2+2

OR

a) Consider an ordered file with r=30000 records (fixed length) of size R=100 bytes stored on a disk with block size B=1024 bytes. Suppose each index entry in the index file takes 15 bytes (9 bytes for index value, 6 bytes for pointer). What is the number of accessing blocks for the primary index?
b) Consider a B-tree for the following set of key values: [3,4,6,8,12,17,23,29,31,10,11] when the number of pointers that will fit in one node is: 3. 5+5

Group-B (CO5)

a) Explain 2PL with example.
b) Prove 2PL protocol ensures serializability.
c) What do you mean by deadlock in a multi-user environment?
d) When a schedule is called recoverable schedule? Expalin with a suitable example. 3+3+2+2

OR

E. Discuss ACID properties of transaction. 4+(4+2)
F. Describe one non-log based recovery technique. What is the limitation of this technique?

OR

a) Explain :'deadlock cannot occur in timestamp based protocol'.
b) Find out whether the following schedule S is conflict serializable or not?
S: [R3(Y); R3(Z); R1(X); W1(X); W3(Z); W3(Y); R2(Z); R1(Y); W1(Y); R2(Y); W2(Y); R2(X); W2(X)]
If conflict serializable then specify the equivalent serial schedule.
c) What do you mean by shared and exclusive lock? 4+(3+1)+2

Group-C (CO3)

Consider the following relations and write the SQL queries: 5X2=10

Book: {<u>isbn</u>, title, subject, pb_yr, price, aid, pid}
Author: {<u>aid</u>, name, city}
Publisher: {<u>pid</u>, name, city}
Book_Order: {<u>orderNo, isbn</u>, quantity, date }

i) Display the title, new_price of all books published after year 2004. (new_price= price*0.15)
ii) Get the average price as AVG_PR of each subject books.
iii) Get the title, subject and price of all books written by Navathe, published by PHI.

iv) Retrieve the name of publishers who publishes more than 5 books.
v) Get the id and name of the publishers who have not published any books.

Consider the following relations and write the SQL queries:
Employee (employee_name, street, city)
Works (employee_name, company_name, salary)
Company (company_name, city)
Manages (employee_name, manager_name)

Formulate the following queries in **SQL** **2+3+2+3**

e. Find the names, street and cities of residence of all employees who work for 'First Bank Corporation' and earn more than $10,000.
f. Find all employees in the database who live in the same cities as the companies for which they work.
g. Find all employees in the database who earn more than each employee of Small Bank corporation.
h. Find the names of all employees who work for PQR.

Assignment -1 for 3rd year CSE 2017

Year: 3RD Semester: 2nd Section: A

Paper Name: Database Management System **FM:** 60

Paper Code: CS 601 **Submission Date:** 18/03/2016

4. Construct an E-R diagram for a Car-insurance company that has a set of customers, each of whom owns one or more cars. Each car has associated with it zero to any number of recorded accidents. Convert the E-R schema into Relational schema. (5)

5. Consider following relation schemas (7+7+7)
   Sailors(sid, sname, rating, age)
   Boats(bid, bname, color)
   Reserves(sid, bid, day)
   Write down following queries in RA, TRC and SQL expressions

   h) Find all sailors with rating above 7
   i) Find names and ages of sailors with rating above 7
   j) Find the sailor name, boat id and reservation date for each reservation
   k) Find the names of the sailors who have reserved boat number 103.
   l) Find the names of the sailors who have reserved a red boat.
   m) Find the names of the sailors who have reserved at least two boats.
   n) Find the names of the sailors who have reserved all boats.

6. Consider following two relation schemas:
   Employee (eno, ename, job, hiredate, managerno, salary, comm., dno)
   Dept (dno, dname, location)
   Solve the following queries using SQL: (5)

   i) List the name of the employees with their immediate higher authority.
   ii) List the name of the employee whose name either starts or ends with "S".
   iii) List the department name and the total salary payable in each department.
   iv) List out the employees who earn more than the average salary of their department.
   v) List the names of the employees who are working more than thirty years in the company.

9. Consider a relation schema R(A, B, C, D). For each of the following sets of FDs, assuming those are the only dependencies that hold on R, do the following: 5x3
   i) Identify the candidate key(s) for *R*.
   ii) Identify the best normal form that *R* satisfies (1NF, 2NF, 3NF, or BCNF).
   iii) If R is not in BCNF, decompose it into a set of BCNF relations that preserve the dependencies.

   1. $C \rightarrow D, C \rightarrow A, B \rightarrow C$
   2. $B \rightarrow C, D \rightarrow A$
   3. $ABC \rightarrow D, D \rightarrow A$
   4. $A \rightarrow B, BC \rightarrow D, A \rightarrow C$
   5. $AB \rightarrow C, AB \rightarrow D, C \rightarrow A, D \rightarrow B$

10. Prove that any relation schema with two attributes is in BCNF. (4)
11. Prove that every 3NF schema is in 2NF. (4)
12. Prove that a relation with primary key of single attribute is always in 2NF. (3)
13. Suppose schema R = (A,B,C,D,E) with F = { A → BC, CD → E, B → D, E → A} is decomposed into (A, B, C) and (A,D,E). Show that this decomposition is lossless-join decomposition. (3)


Director
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