Course: BTech

Semester: 3

Prerequisite: Basic Computer Knowledge |

Rationale: The course will enable students to understand the different issues involved in the design and implementation of a database system as well execute various database queries using SQL.

Teaching and Examination Scheme

Teaching Scheme					Examination Scheme					Total
Lecture Hrs/Week	Tutorial Hrs/Week	Lab Hrs/Week	Hrs/Week	Credit	Internal Marks			External Marks		
					T	CE	P	T	P	
3	0	0	0	3	20	20	-	60	-	100

SEE - Semester End Examination, **CIA** - Continuous Internal Assessment (It consists of Assignments/Seminars/Presentations/MCQ Tests, etc.)

Course Content

W - Weightage (%) , **T** - Teaching hours

Sr.	Topics	W	T
1	**Introduction:** Introduction and applications of DBMS, File Processing System and its limitations, ANSI/SPARC Model, Data Independence, Client-Server Architecture, Users & DBA, Database Architecture.	10	3
2	**SQL:** Data Definition Language (DDL) commands, Data Manipulation Language (DML) commands, Data Control Language (DCL) commands, Transaction Control Language (TCL) commands. **Predicates & Clauses:** Logical Operators (AND / OR), Relational Operators, BETWEEN Predicate, IN & NOT IN Predicate, LIKE Predicate. **Functions in SQL**: Aggregate Functions, Character Functions, Arithmetic Functions, Date Functions, Conversion Functions.	10	4
3	**Data Models:** Hierarchical Model, Network Model, Relational Model, Object Oriented Model. **E-R Diagram:** Introduction to E-R Diagram, Entities, Attributes & its types, Relationships, Mapping Cardinalities, Participation Constraints, Weak Entity Sets, Specialization, Generalization, Aggregation.	10	5
4	**Relational Data Model:** **Relational Data Model:** Introduction, Degree, Cardinality. **Constraints & Keys:** Primary Key, Foreign Key, Super Key, Candidate Key, Not Null Constraint, Check Constraint. **Relational Algebra Operations:** Selection, Projection, Cross-Product, Rename, Joins (Natural & Outer Join), Set Operators (Union, Intersection, Set Difference), Aggregate Functions.	10	4
5	**Relational Database Design:** Functional Dependency – definition, trivial and non-trivial FD, Armstrong's Axioms/Inference Rules, Closure of FD, Closure of Attributes, Candidate Key, Finding a Candidate Key, Decomposition (Lossy & Lossless), Database Anomalies, Normalization – 1Nf, 2NF, 3NF, BCNF, 4NF, 5NF	20	6
6	**Transaction:** **Transaction:** Introduction, ACID Properties, Transaction Life Cycle, Scheduling, Serial Schedule, Interleaved Schedule, Transaction Operations, Serializability (View & Conflict), Two-Phase Commit Protocol. **Database Recovery:** Introduction, Log Based Recovery, Shadow Paging, Checkpoints. **Concurrency Control:** Introduction, Lock Based Protocol, Two Phase Lock Protocol, Intention Locking, Multiple Granularity, Time-based Protocol. **Deadlock:** Introduction, Deadlock Detection, Deadlock Recovery, Deadlock Prevention (Wait-Die, Wound-Wait & Timeout-Based Approach).	20	12
7	**Query Processing:** **Query Processing:** Introduction, Layers of Query Processing, Measures of Query Cost, File Scans (Linear & Binary Search), Materialized View, Pipelining. **Query Optimization:** Introduction, Equivalence Rules, Cost-Based Query Optimization.	10	3
8	**Security:** **Security:** Data Security, Data Integrity, Authentication, Authorization, Encryption, Decryption, Access Control (DAC,	5	2

	RBAC, MAC), Intrusion Detection, SQL Injection		
9	**PL/SQL Concepts:**Views, PL/SQL Block, Cursors, Triggers, Stored Procedures, Store Functions	5	3

Reference Books

1.	**Database System Concepts** By Abraham Silberschatz, Henry Korth, S. Sudarshan | McGraw Hill International | 6th Edition
2.	**An Introduction to Database Systems** By C. J. Date, A. Kannan, S. Swamynathan | Pearson Education | 8th Edition
3.	**SQL, PL/SQL – The Programming Language** By Ivan Bayross | BPB Publications

Course Outcome

After Learning the Course the students shall be able to:

After Learning the Course the students shall be able to:
1. Understand basic concepts of Database.
2. Understand Relational Models and its importance.
3. Build proper structured database for a given problem or application.
4. Learn how various transactions are managed in real-time scenarios.
5. Understand the evaluation parameters of a query as well as security parameters of database.
6. Implement SQL concepts to build dynamic database applications.

Miscellaneous

Exam Requirement

It consists of Assignments/Seminars/Presentations/Quizzes/Surprise Tests (Summative/MCQ) etc.

Course: BTech   **Semester:** 3

Prerequisite: Basic Computer Knowledge |

Rationale: The course will enable students to understand the different issues involved in the design and implementation of a database system as well execute various database queries using SQL.

Teaching and Examination Scheme										

Teaching Scheme					Examination Scheme					Total
Lecture Hrs/Week	Tutorial Hrs/Week	Lab Hrs/Week	Hrs/Week	Credit	Internal Marks			External Marks		
					T	CE	P	T	P	
0	0	2	0	1	-	-	20	-	30	50

SEE - Semester End Examination, **CIA** - Continuous Internal Assessment (It consists of Assignments/Seminars/Presentations/MCQ Tests, etc.)

Course Outcome

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List of Practical

1.

1. What is DBMS? Explain advantages of DBMS over FPS.
2. List 15 applications of Database.Explain any 2 how Database can be helpful in managing that application?
3. Create the Database for the following:

   1. Student Details using Excel.
   2. Employees Details using MS Access
   3. Facebook using Excel

2.

Create following Tables:

Important Instructions:

- Use **varchar2(30)** datatype for **Alphanumeric Characters and Special Symbols, number** datatype for **Numbers, date datatype for Date.**

·Use same table and column name (Capital and

Small Case) as mentioned in this file.

- **Insert proper data (Capital and Small Case) as mentioned in this file.**
- **Employee**
- **Emp_name Street City** Adam Spring Pittsfield Brooks Senator Brooklyn Curry North Rye Demalo SunShine San Deago

3.	Simple Queries:
	1. Describe deposit, branch.
	2. Describe borrow, customers.
	3. List all data from table DEPOSIT.
	4. List all data from table BORROW.
	5. List all data from table CUSTOMERS.
	6. List all data from table BRANCH.
	7. Give account no and amount of depositors.
	8. List all data from SAILORS.
	9. List Boat Name and its color.
	10. List Employee name and its city.
	11. List all the details of Clients.
	12. Describe various products and its price.
	13. Describe sailor's name, age and its rating.
	14. Describe the managers of various employees
	15. Describe the details of Loan for customers.
	16. Describe the date of travel of various sailors.
4.	Simple Queries:
	(1) Give name of depositors having amount greater than 4000.
	(2) List the employees having salary less than 22000.
	(3) List the sailors having age more than 25.
	(4) List the boats travelling on 10-oct-98
	(5) List the details of boat "Interlake".
	(6) List the details of the red colored boat.
	(7) List the details of clients whose city is Mumbai
	(8) List Client Name, due balance and city of the clients having balance greater than 1500.
	(9) Describe the details of products having selling price less than 500.
	(10) List the products for which quantity ordered is less than 120 and cost price is greater than 250.
	(11) Display account details having amount greater 2200.
	(12) Display all the customers staying in Nagpur
	(13) Display the names of sailors having rating greater than 7
	(14) Display the orders made in the month of June
	(15) List all the accounts created in the month of March
5.	"Like" Queries:
	1. Display all customers whose name start with 'M'.
	2. Display all the customers whose name ends with 'L'.
	3. Display all loan details whose branch starts with 'A'.
	4. Display the details of sailors whose name is minimum 6 characters long.
	5. Display the details of Employees whose address starts with 'S'.
	6. List the details of the boat ending with 'e'.
	7. List the details of clients having 'h' as a 3rd character in his/her name.
	8. List Client Name, due balance and city whose pin code starts with 4.
	9. List all customers whose city contains 'a' as second character.
	10. List client names and city whose state has 'a' as fourth or fifth character.

6.	**"Aggregate Functions & DML" Queries:**
	1. List total deposit from deposit..
	2. Give Maximum loan given to a customer.
	3. Describe the average age of all the sailors.
	4. Count total number of customers
	5. Count total number of customer's cities.
	6. Display total target for the salesman.
	7. Update the salary of the employee having 10000 to 11500
	8. Update the city of client from Bangalore to Bengaluru.
	9. Give the 15% hike in the salary of all the Employees. Rename that column to "New Salary".
	10. Increase the sell price of all products by 20% and label new column as "New Sell Price". (Do not update the table)
	11. Provide the count of customers staying in "Bombay"
7.	**"Join" Queries:**
	1. Find the salary of Adam.
	2. Find the city where Brooks work.
	3. Display the sailor's details whose boat is booked for 9th May, 98.
	4. Display the day of ride and sailor name for boat 103.
	5. Display the sailor name and its age for Red colored and 101 boat.
	6. Display the sailor details whose boat is never booked.
	7. Display the sailor name that has Red or Green Boat.
	8. Display all sailor details and boat details and who has Interlake boat.
	9. Display sailor's rating with boat details or the trip on 10th October, 98.
	10. Display the sailor id and name whose age is more than 42 or who has Blue colored boat.
	11. Display name and rating of sailor whose boat name is Clipper.
	12. List products whose selling price is more than 500 and less than equal to 750.
	13. Describe the second highest salary of an employee.
	14. Display the date of travel and sailor's name whose age is between 35 and 65.
	15. List all the employees working for "FBC".
8.	**"Join" Queries:**
	1. Display all the employee name and the city where they work.
	2. Display the employee name and company's name having salary more than 15000.
	3. Find the average rating and age of all sailors.
	4. List various products available.
	5. Display the names of salesman who have salary more than 2850.
	6. Change the cost price of Trousers to 950
	7. List all the clients having "a" as a second character in their names.
	8. List all the products whose QtyonHand is less than Reorderlvl.
	9. Print the description and total qty sold for each product.
	10. Find out all the products which have been sold to "Ivan Bayross".
	11. Find the names of all clients who have purchased Trousers.
	12. Find the products and their quantities for the orders placed by client C00001 and C00002.
	13. List the client details who place order no. O19001.
	14. List the name of clients who have placed orders worth Rs. 10000 or more.
	15. Find the total of Qty ordered for each Order.
9.	**"Miscellaneous" Queries:**
	1. Find the average rate for each Order.
	2. Give the loan details of all the customers.
	3. List the customer name having loan account in the same branch city they live in.
	4. Provide the loan details of all the customers who have opened their accounts after August'95.
	5. List the order information for client C00001 and C00002.
	6. List all the information for the order placed in the month of june.

7. List the details of clients who do not stay in Maharashtra.
8. Determine the maximum and minimum product price. Rename the output as "Max_Price" and "Min_Price".
9. Count the number of products having price less than or equal to 500.
10. List the order number and the day on which client placed an order.
11. List the month and the date on which an order is to be delivered.
12. List the date, 25 days after today's date.
13. Find the total of all the billed orders in the month of June.
14. List the products and orders from customers who have ordered less than 5 units of "Pull Overs".
15. Find the list of products and orders placed by "Ivan Bayrosss" and "Mamta Muzumdar".
16. List the clients who placed order before June'04.
17. List all the clients who stays in "Bengaluru" or "Mangalore".

10.	**PL/SQL Block:**
	1. Write a PL/SQL Block to Add 2 Numbers
	2. Write a PL/SQL Block to find Area of Rectangle, Triangle and Square.
	3. Write a PL/SQL Block to find Maximum of 3 numbers
	4. Write a PL/SQL Block to print sum of N Numbers using For Loop.
	5. Write a PL/SQL Block to generate Fibonacci series of N numbers

Miscellaneous

Exam Requirement

It consists of Assignments/Seminars/Presentations/Quizzes/Surprise Tests (Summative/MCQ) etc