DATABASE MANAGEMENT SYSTEM **Course Code : 313302**

Programme Name/s	**: Artificial Intelligence/ Artificial Intelligence and Machine Learning/ Cloud Computing and Big Data/ Computer Technology/ Computer Engineering/ Computer Science & Engineering/ Data Sciences/ Computer Hardware & Maintenance/ Information Technology/ Computer Science & Information Technology/ Computer Science/ Electronics & Computer Engg./**
Programme Code	**: AI/ AN/ BD/ CM/ CO/ CW/ DS/ HA/ IF/ IH/ SE/ TE**
Semester	**: Third**
Course Title	**: DATABASE MANAGEMENT SYSTEM**
Course Code	**: 313302**

I. RATIONALE

This course focuses on fundamentals of relational database management system and enables students to design and manage database for various software applications. It also provides students with theoretical knowledge and practical skills in the use of databases and database management systems in Information Technology applications.

II. INDUSTRY / EMPLOYER EXPECTED OUTCOME

To design database and use any RDBMS package as a backend for developing database applications.

III. COURSE LEVEL LEARNING OUTCOMES (COS)

Students will be able to achieve & demonstrate the following COs on completion of course based learning

- CO1 - Explain concept of database management system.
- CO2 - Design the database for given problem.
- CO3 - Manage database using SQL.
- CO4 - Implement PL/SQL codes for given application.
- CO5 - Apply security and backup methods on database.

IV. TEACHING-LEARNING & ASSESSMENT SCHEME

Course Code	Course Title	Abbr	Course Category/s	Learning Scheme					Credits	Assessment Scheme											
				Actual Contact Hrs./Week			SLH	NLH		Paper Duration	Theory				Based on LL & TL				Based on SL		Total Marks
															Practical						
				CL	TL	LL					FA-TH	SA-TH	Total		FA-PR		SA-PR		SLA		
											Max	Max	Max	Min	Max	Min	Max	Min	Max	Min	
313302	DATABASE MANAGEMENT SYSTEM	DMS	DSC	3	1	4	2	10	5	3	30	70	100	40	50	20	25#	10	25	10	200

Total IKS Hrs for Sem. : 0 Hrs
Abbreviations: CL- ClassRoom Learning , TL- Tutorial Learning, LL-Laboratory Learning, SLH-Self Learning Hours, NLH-Notional Learning Hours, FA - Formative Assessment, SA -Summative assessment, IKS - Indian Knowledge System, SLA - Self Learning Assessment
Legends: @ Internal Assessment, # External Assessment, *# On Line Examination , @$ Internal Online Examination
Note :

1. FA-TH represents average of two class tests of 30 marks each conducted during the semester.
2. If candidate is not securing minimum passing marks in FA-PR of any course then the candidate shall be declared as "Detained" in that semester.
3. If candidate is not securing minimum passing marks in SLA of any course then the candidate shall be declared as fail and will have to repeat and resubmit SLA work.
4. Notional Learning hours for the semester are (CL+LL+TL+SL)hrs.* 15 Weeks
5. 1 credit is equivalent to 30 Notional hrs.
6. * Self learning hours shall not be reflected in the Time Table.
7. * Self learning includes micro project / assignment / other activities.

V. THEORY LEARNING OUTCOMES AND ALIGNED COURSE CONTENT

Sr.No	Theory Learning Outcomes (TLO's)aligned to CO's.	Learning content mapped with Theory Learning Outcomes (TLO's) and CO's.	Suggested Learning Pedagogies.
1	TLO 1.1 Explain given database concept. TLO 1.2 Explain Overall structure of DBMS TLO 1.3 Describe architecture of database.	**Unit - I Introduction To Database System** 1.1 Database concepts:-Data, Database, Database management system, File system Vs DBMS, Applications of DBMS, Data Abstraction, Data Independence, Database Schema, The Codd's rules, Overall structure of DBMS 1.2 Architecture:- Two tier and Three tier architecture of database. 1.3 Data Models:- Hierarchical, Networking, Relational Data Models.	Presentations, Hands-on, Chalk-Board.
2	TLO 2.1 Explain relational structure of database. TLO 2.2 State types of keys with example. TLO 2.3 Draw ER diagrams for given problem. TLO 2.4 Explain different normalization forms.	**Unit - II Relational Data Model** 2.1 Relational Structure :- Tables (Relations), Rows (Tuples), Domains, Attributes, Entities 2.2 Keys :- Super Keys, Candidate Key, Primary Key, Foreign Key. 2.3 Data Constraints :- Domain Constraints ,Referential Integrity Constraints 2.4 Entity Relationship Model : - Strong Entity set, Weak Entity set, Types of Attributes, Symbols for ER diagram, ER Diagrams 2.5 Normalization:- Functional dependencies, Normal forms: 1NF, 2NF, 3NF	Presentations, Hands-on, Chalk-Board.

Sr.No	Theory Learning Outcomes (TLO's)aligned to CO's.	Learning content mapped with Theory Learning Outcomes (TLO's) and CO's.	Suggested Learning Pedagogies.
3	TLO 3.1 Write SQL queries using DDL, DML, DCL and TCL. TLO 3.2 Write SQL queries to join relations. TLO 3.3 Write SQL queries for ordering and grouping data. TLO 3.4 Use various class of operators in SQL. . TLO 3.5 Create schema objects for performance tunning.	**Unit - III Interactive SQL and Performance Tuning** 3.1 SQL: -Data-types, Data Definition Language (DDL), Data Manipulation language (DML), Data Control Language (DCL), Transaction Control Language (TCL). 3.2 Clauses & Join:- Different types of clauses - Where, Group by ,Order by, Having. Joins: Types of Joins, Nested queries. 3.3 Operators:- Relational, Arithmetic, Logical, Set operators. 3.4 Functions:- Numeric , Date and time, String functions, Aggregate Functions. 3.5 Views, Sequences, Indexes: -Views : Concept ,Create ,Update, Drop Views. Sequences :- Concept ,Create, Alter , Drop, Use of Sequence in table, Index: Concept ,Types of Index , Create ,Drop Indexes	Presentations, Hands-on, Chalk-Board.
4	TLO 4.1 Use control Structures in PL-SQL. TLO 4.2 Handle different types of exceptions. TLO 4.3 Explain various types of cursors. TLO 4.4 Create Procedure, Function on given problem. TLO 4.5 Explain types of triggers with examples	**Unit - IV PL/SQL Programming** 4.1 Introduction of PL/SQL: -Advantages of PL/SQL,The PL/SQL Block Structure, PL/SQL Data Types, Variable , Constant 4.2 Control Structure:- Conditional Control, Iterative Control, Sequential Control. 4.3 Exception handling: -Predefined Exception, User defined Exception. 4.4 Cursors:- Implicit and Explicit Cursors, Declaring, opening and closing cursor, fetching a record from cursor ,cursor for loops, parameterized cursors 4.5 Procedures:- Advantages, Create, Execute and Delete a Stored Procedure 4.6 Functions:- Advantages, Create, Execute and Delete a Function 4.7 Database Triggers :- Use of Database Triggers, Types of Triggers, Create Trigger, Delete Trigger	Presentations, Hands-on, Chalk-Board.

Sr.No	Theory Learning Outcomes (TLO's)aligned to CO's.	Learning content mapped with Theory Learning Outcomes (TLO's) and CO's.	Suggested Learning Pedagogies.
5	TLO 5.1 Implement SQL queries for database administration. TLO 5.2 Explain concept of various types database backup processes. TLO 5.3 Describe various terms related to advanced database concepts.	**Unit - V Database Administration** 5.1 Introduction to database administration:- Types of database users, Create and delete users, Assign privileges to users 5.2 Transaction: Concept, Properties & States of Transaction 5.3 Database Backup: Types of Failures, Causes of Failure, Database backup introduction, types of database backups: Physical & Logical 5.4 Data Recovery – Recovery concepts , recovery techniques- roll forward ,Rollback 5.5 Overview of Advanced database concepts:- Data Warehouse ,Data lakes , Data mining, Big data ,Mongo DB , DynamoDB,	Presentations, Hands-on, Chalk-Board.

VI. LABORATORY LEARNING OUTCOME AND ALIGNED PRACTICAL / TUTORIAL EXPERIENCES.

Practical / Tutorial / Laboratory Learning Outcome (LLO)	Sr No	Laboratory Experiment / Practical Titles / Tutorial Titles	Number of hrs.	Relevant COs
LLO 1.1 Install database software	1	* Install the provided database software	2	CO1
LLO 2.1 Create Database schema for given application	2	*Note :- Ensure to Carry out following activities before creating database: - Draw ER diagram for given problem - Normalize the relation up to 3NF 1) Create Database for given application 2) Create tables for the given application 3)Assign Primary key for created table 4) Modify the table as per the application needs	4	CO1
LLO 3.1 Execute DDL Commands to manage database using SQL	3	* Write queries using DDL Statements for following operations – 1)Create, alter, truncate, drop ,rename table 2) Apply Key Constraints for suitable relation.	2	CO3

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Practical / Tutorial / Laboratory Learning Outcome (LLO)	Sr No	Laboratory Experiment / Practical Titles / Tutorial Titles	Number of hrs.	Relevant COs
LLO 4.1 Execute DML Commands to manipulate data using SQL	4	* Write queries using DML Statements for following operations – 1) Select, Insert, delete, update, table 2) Apply Key Constraints for suitable relation.	2	CO3
LLO 5.1 Execute DCL Commands to control the access to data using SQL .	5	* Write queries using DCL Statements for following operations – 1)Grant, Revoke	2	CO3
LLO 6.1 Execute TCL Commands to control transactions on data using SQL .	6	* Write queries using TCL Statements for following operations – 1) Commit, Rollback, Savepoint	2	CO3
LLO 7.1 Implement Queries using Arithmetic operators	7	Write Queries using built-in Arithmetic operators.	2	CO3
LLO 8.1 Implement Logical operators to apply various conditions in query.	8	Apply built-in Logical operators on given data	2	CO3
LLO 9.1 Implement Relational operators to apply various conditions in query.	9	Apply built-in relational operators on given data	2	CO3
LLO 10.1 Write Queries to implement SET operations using SQL .	10	* Use following Set operators to perform different operations.	2	CO3
LLO 11.1 Execute queries using String functions	11	Write SQL Queries using built-in String functions	2	CO3
LLO 12.1 Execute queries using Arithmetic functions	12	Write SQL Queries using built-in Arithmetic functions	2	CO3
LLO 13.1 Implement queries using Date and Time functions	13	Write Queries using built-in Date and Time functions	4	CO3
LLO 14.1 Implement queries using Aggregate functions	14	Write Queries using SQL built-in Aggregate functions	2	CO3
LLO 15.1 Execute Queries for ordering and grouping data.	15	* Implement Queries Using different Where, Having, Group by, & Order by clauses .	2	CO3
LLO 16.1 Execute the queries based on Inner & outer join	16	* Implement SQL queries for Inner and Outer Join	2	CO3
LLO 17.1 Create and manage Views for faster access on relations.	17	* Create and Execute Views ,Seqeuence and Index in SQL.	4	CO3
LLO 18.1 Implement PL/SQL program using Conditional Statements	18	* Write a PL/SQL program using Conditional Statements- if, if then else ,nested if, if elseif else	2	CO4
LLO 19.1 Implement PL/SQL program using Iterative Statements	19	* Write a PL/SQL program using Iterative Statements- loop,for, do-while, while	2	CO4
LLO 20.1 Implement PL/SQL program using Sequential Control	20	Write a PL/SQL program using Sequential Control-switch, continue,goto	2	CO4
LLO 21.1 Create implicit & explicit cursors	21	* Write a PL/SQL code to implement implicit & explicit cursors	2	CO4

Practical / Tutorial / Laboratory Learning Outcome (LLO)	Sr No	Laboratory Experiment / Practical Titles / Tutorial Titles	Number of hrs.	Relevant COs
LLO 22.1 Implement PL/SQL program based on Exception Handling (Pre-defined exceptions)	22	* Write a PL/SQL program based on Exception Handling (Pre-defined exceptions)	2	CO4
LLO 23.1 Implement PL/SQL program based on Exception Handling (user defined exceptions)	23	* Write a PL/SQL program based on Exception Handling (user defined exceptions)	2	CO4
LLO 24.1 Create Procedures and stored procedures for modularity.	24	* Write a PL/SQL code to create Procedures and stored procedures	2	CO4
LLO 25.1 Create function for given database	25	* Write a PL/SQL code to create functions.	2	CO4
LLO 26.1 Implement triggers for given database.	26	* Write a PL/SQL code to create triggers for given database.	2	CO4
LLO 27.1 Implement SQL queries for database administration.	27	Execute DCL commands using SQL 1) Create Users 2) Grant Privileges to users 3)Revoke Privileges to users	2	CO5

Note : Out of above suggestive LLOs -

- '*' Marked Practicals (LLOs) Are mandatory.
- Minimum 80% of above list of lab experiment are to be performed.
- Judicial mix of LLOs are to be performed to achieve desired outcomes.

VII. SUGGESTED MICRO PROJECT / ASSIGNMENT/ ACTIVITIES FOR SPECIFIC LEARNING / SKILLS DEVELOPMENT (SELF LEARNING)

Self Learning

- Implement PL/SQL code for relevant topics suggested by the teacher.
- Complete any one course related to Database Management System on Infosys Springboard platform.

Assignment

- Solve an assignment on any relevant topic given by the teacher.

Micro project

- Develop a database for restaurant management system. The restaurant maintain catalogue for the list of food items and generate bill for the ordered food.
- Prepare Invoice management system for electricity bill generation. Accept meter reading as inputs and generate respective bill amount for the same.
- Design a database for registration and admission of patient for Hospital management system, draw ER diagram and normalize the database up to 3NF.
- Any topic suggested by teacher.

Note :

- Above is just a suggestive list of microprojects and assignments; faculty must prepare their own bank of microprojects, assignments, and activities in a similar way.
- The faculty must allocate judicial mix of tasks, considering the weaknesses and / strengths of the student in acquiring the desired skills.
- If a microproject is assigned, it is expected to be completed as a group activity.
- SLA marks shall be awarded as per the continuous assessment record.
- For courses with no SLA component the list of suggestive microprojects / assignments/ activities are optional, faculty may encourage students to perform these tasks for enhanced learning experiences.
- If the course does not have associated SLA component, above suggestive listings is applicable to Tutorials and maybe considered for FA-PR evaluations.

VIII. LABORATORY EQUIPMENT / INSTRUMENTS / TOOLS / SOFTWARE REQUIRED

Sr.No	Equipment Name with Broad Specifications	Relevant LLO Number
1	Computer system - (Any computer system with basic configuration)	All
2	Any RDBMS software (MySQL/Oracle/SQL server/ or any other)	All

IX. SUGGESTED WEIGHTAGE TO LEARNING EFFORTS & ASSESSMENT PURPOSE (Specification Table)

Sr.No	Unit	Unit Title	Aligned COs	Learning Hours	R-Level	U-Level	A-Level	Total Marks
1	I	Introduction To Database System	CO1	6	4	6	2	12
2	II	Relational Data Model	CO2	8	2	4	6	12
3	III	Interactive SQL and Performance Tuning	CO3	12	2	6	10	18
4	IV	PL/SQL Programming	CO4	12	4	4	10	18
5	V	Database Administration	CO5	7	2	4	4	10
Grand Total				**45**	**14**	**24**	**32**	**70**

X. ASSESSMENT METHODOLOGIES/TOOLS

Formative assessment (Assessment for Learning)

- Continuous assessment based on process and product related performance indicators.
- Each practical will be assessed considering 60% weightage to process, 40% weightage to product.
- A continuous assessment based term work.

Summative Assessment (Assessment of Learning)

- End semester examination, Lab performance, Viva voce

XI. SUGGESTED COS - POS MATRIX FORM

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Course Outcomes (COs)	Programme Outcomes (POs)							Programme Specific Outcomes* (PSOs)		
	PO-1 Basic and Discipline Specific Knowledge	PO-2 Problem Analysis	PO-3 Design/ Development of Solutions	PO-4 Engineering Tools	PO-5 Engineering Practices for Society, Sustainability and Environment	PO-6 Project Management	PO-7 Life Long Learning	PSO-1	PSO-2	PSO-3
CO1	3	-	-	-	1	-	1			
CO2	2	2	3	2	1	2	1			
CO3	1	2	2	2	-	2	1			
CO4	1	3	3	2	1	3	2			
CO5	1	1	2	2	2	2	1			

Legends :- High:03, Medium:02,Low:01, No Mapping: -
*PSOs are to be formulated at institute level

XII. SUGGESTED LEARNING MATERIALS / BOOKS

Sr.No	Author	Title	Publisher with ISBN Number
1	Henry F. Korth	Database System Concepts	McGraw Hill Education ISBN : 9780078022159
2	Ivan Bayross	SQL, PL/SQL – The Programming Language of Oracle	BPB Publication ISBN 10: 8170298997 BPB Publication ISBN 13: 9788170298991
3	ISRD Group	Introduction to Database Management Systems	McGraw Hill Education ISBN 10: 0070591199 McGraw Hill Education ISBN-13 : 978-0070591196

XIII . LEARNING WEBSITES & PORTALS

Sr.No	Link / Portal	Description
1	https://nptel.ac.in/courses/106105175	Data Base Management System
2	https://www.w3schools.com/sql/	SQL Tutorial
3	https://www.tutorialspoint.com/sql/index.htm	SQL Programming Language

Note :

- Teachers are requested to check the creative common license status/financial implications of the suggested online educational resources before use by the students