NATIONAL INSTITUTE OF TECHNOLOGY, TIRUCHIRAPPALLI

DEPARTMENT OF COMPUTER SCIENCE AND ENGINEERING

COURSE PLAN – PART I			
Name of the programme and specialization	**B.Tech. Computer Science and Engineering**		
Course Title	**Database Management and Systems**		
Course Code	**CSPC52**	**No. of Credits**	**3**
Course Code of Pre-requisite subject(s)	**NIL**		
Session	**July 2021**	**Section (if, applicable)**	**B, V Semester**
Name of Faculty	**Dr. M. Brindha**	**Department**	**CSE**
Email	brindham@nitt.edu	**Telephone No.**	9944627902
Name of Course Coordinator(s) (if, applicable)	NA		
E-mail		**Telephone No.**	
Course Type	**Core Course**		

Syllabus (approved in Senate)

Unit – I

Introduction: Purpose of Database System -– Views of data – data models, database management system, three-schema architecture of DBMS, components of DBMS. E/R Model - Conceptual data modeling - motivation, entities, entity types, attributes, relationships, relationship types, E/R diagram notation, examples.

Unit – II

Relational Model: Relational Data Model - Concept of relations, schema-instance distinction, keys, referential integrity and foreign keys, relational algebra operators, SQL - Introduction, data definition in SQL, table, key and foreign key definitions, update behaviors. Querying in SQL, notion of aggregation, aggregation functions group by and having clauses, embedded SQL

Unit – III

Database Design: Dependencies and Normal forms, dependency theory – functional dependencies, Armstrong's axioms for FD's, closure of a set of FD's, minimal covers, definitions of 1NF, 2NF, 3NF and BCNF, decompositions and desirable properties of them, algorithms for 3NF and BCNF normalization, 4NF, and 5NF

Unit – IV

Transactions: Transaction processing and Error recovery - concepts of transaction processing, ACID properties, concurrency control, locking based protocols for CC, error recovery and logging, , undo-redo logging and recovery methods.

Unit – V

Implementation Techniques: Data Storage and Indexes - file organizations, primary, secondary index structures, various index structures - hash-based, dynamic hashing techniques, multi-level indexes, B+ trees.

COURSE OBJECTIVES

- ➢ To learn data models, conceptualize and depict a database system using ER diagram
- ➢ To understand the internal storage structures in a physical DB design
- ➢ To know the fundamental concepts of transaction processing techniques
- ➢ To understand the concept of Database Design in Normalization techniques
- ➢ To know the manipulation of SQL Queries

COURSE OUTCOMES (CO)

- ➢ Install, configure, and interact with a relational database management system
- ➢ Master the basics of SQL and construct queries using SQL
- ➢ Design and develop a large database with optimal query processing
- ➢ Develop efficient storage scheme of saving and retrieving Records and Files
- ➢ Design the database with normalization techniques

Course Outcome (CO)	Aligned programme Outcome
Install, configure, and interact with a relational database management system	3
Master the basics of SQL and construct queries using SQL	1, 3, 10
Design and develop a large database with optimal query processing	1, 3, 12
Develop efficient storage scheme of saving and retrieving Records and Files	1, 3, 7
Design the database with normalization techniques	1, 3, 10

COURSE PLAN – PART II

COURSE OVERVIEW

This course mainly describes the concepts and techniques for effective storage and retrieval of data in an information repository. The course introduces the basic functionalities provided by modern Database Management system.

COURSE TEACHING AND LEARNING ACTIVITIES

S.No.	Week	Topic	Mode of Delivery
1.	I Week	Introduction: Purpose of Database System –– Views of data – data models, database management system, three-schema architecture of DBMS	Online Lecture
2.	II Week	Components of DBMS. E/R Model - Conceptual data modeling - motivation, entities, entity types, attributes, relationships, relationship types, E/R diagram notation, examples.	Online Lecture

3.	III Week	Relational Model: Relational Data Model - Concept of relations, schema-instance distinction, keys, referential integrity and foreign keys, relational algebra operators	Online Lecture
4.	IV Week	SQL - Introduction, data definition in SQL, table, key and foreign key definitions, update behaviors. Querying in SQL, notion of aggregation,	Online Lecture
5.	V Week	Working with aggregation functions group by and having clauses, embedded SQL, Functions, Procedures and Triggers in SQL	Online Lecture
6.	VI Week	Database Design: Dependencies and Normal forms, dependency theory – functional dependencies, Armstrong's axioms for FD's	Online Lecture
7.	VII Week	Closure of a set of FD's, minimal covers, definitions of 1NF, 2NF, 3NF and BCNF	Online Lecture
8.	VIII Week	Decompositions and desirable properties of them, algorithms for 3NF and BCNF normalization, 4NF, and 5NF	Online Lecture
9.	IX Week	Transactions: Transaction processing and Error recovery - concepts of transaction processing,	Online Lecture
10.	X Week	ACID properties, Concurrency control, locking based protocols for CC	Online Lecture
11.	XI Week	Error recovery and logging undo-redo logging and recovery methods.	Online Lecture
12.	XII Week	Data Storage and Indexes - file organizations, primary, secondary index structures	Online Lecture
13.	XIII Week	Various index structures - hash-based, dynamic hashing techniques, multi-level indexes, B+ trees.	Online Lecture

Text Book

1. Silberschatz, Henry F. Korth and S. Sudharshan, “Database System Concepts”, 7th Edition, Tata McGraw Hill, 2019.
2. J. Date, A. Kannan and S. Swamynathan, “An Introduction to Database Systems”, 8th Edition, Pearson Education, 2006.

References Books

1. Ramez Elmasri and Shamkant B. Navathe, “Fundamentals of Database Systems”, Fourth Edition, Pearson/Addision wesley, 2007.
2. Raghu Ramakrishnan, “Database Management Systems”, Third Edition, McGraw Hill, 2003.
3. S.K.Singh, “Database Systems Concepts, Design and Applications”, First Edition, Pearson Education, 2006.

COURSE ASSESSMENT METHODS-THEORY (shall range from 4 to 6)

S.No.	Mode of Assessment	Week/Date	Duration	% Weightage
1.	Assessment-I Technical Quiz- 1	As per Dean (Academic) Schedule	1 Hour	25%
2.	Assessment-II Technical Quiz-2	As per Dean (Academic) Schedule	1 Hour	25%
3.	Assessment-III Assignment- Group/Individual (Programming/Time bound)	As per Dean (Academic) Schedule	Non-contact Hours	20%
CPA	Compensation Assessment*	14th week	1 Hour	25%
4.	Final Assessment*	As per Dean (Academic) Schedule	2 hours	30%
TOTAL				**100%**

***mandatory**

COURSE EXIT SURVEY (mention the ways in which the feedback about the course shall be assessed)

1. Students' feedback through class committee meetings.
2. Feedback questionnaire from students – from MIS at the end of the semester.

COURSE POLICY (preferred mode of correspondence with students, compensation assessment policy to be specified)

MODE OF CORRESPONDENCE (email/ phone etc)
Mode of Correspondence through Phone, Email, MS Teams.

COMPENSATION ASSESSMENT POLICY
If any student is not able to attend Assessment-1 and/or Assessment-2 due to genuine reasons, student is permitted to attend the compensation assessment (CPA) with 25% weightage.

ATTENDANCE POLICY (A uniform attendance policy as specified below shall be followed)

- **At least 75% attendance in each course is mandatory.**
- **A maximum of 10% shall be allowed under On Duty (OD) category.**
- Students with **less than 65% of attendance** shall be prevented from writing the final assessment and **shall be awarded 'V' grade.**

ACADEMIC DISHONESTY & PLAGIARISM

- **Talking to other students, copying from others during an assessment will be treated as punishable dishonesty.**

- **Zero mark to be awarded for the offenders. For copying from another student, both students get the same penalty of zero mark.**
- The departmental disciplinary committee including the course faculty member, PAC chairperson and the HoD, as members shall verify the facts of the malpractice and award the punishment if the student is found guilty. The report shall be submitted to the Academic office.
- The above policy against academic dishonesty shall be applicable for all the programmers.

ADDITIONAL INFORMATION

The students can get their doubts clarified at any time with their faculty member.

FOR APPROVAL

Course Faculty _____ **CC-Chairperson** _____ **HOD** _____