Name of Faculty	:	Faculty of Engineering & Technology
Name of Program	:	Master of Engineering (M. Tech)
Course Code	:	1MSE02
Course Title	:	Data Mining & Business Intelligence
Type of Course	:	Professional Core (PC)
Year of Introduction	:	2023-24

Prerequisite	:	Database Management System
Course Objective	:	NA
Course Outcomes	:	At the end of this course, students will be able to:
	CO1	Interpret the contribution of data warehousing and data mining to the decision-support level of organizations business intelligence.
	CO2	Apply pre-processing statistical methods for any given raw data.
	CO3	Design and Evaluate different dimensional modelling used for OLAP.
	CO4	Categorize and differentiate between situations for applying different data- mining techniques: frequent pattern mining, association, correlation, classification, prediction, cluster, and outlier analysis.
	CO5	Evaluate the performance of different data-mining models/algorithms with respect to their accuracy.
	CO6	Conceptualise a data mining solution to a practical problem.

Teaching and Examination Scheme

Teaching Scheme (Contact Hours)			**Credits**	**Examination Marks**				
				Theory Marks		**Practical Marks**		**Total Marks**
L	**T**	**P**	**C**	**SEE**	**CIA**	**SEE**	**CIA**	
3	0	2	4	70	30	30	20	150

Legends: ***L****-Lecture;* ***T****–Tutorial/Teacher Guided Theory Practice;* ***P*** *– Practical,* ***C*** *– Credit,* ***SEE*** *– Semester End Examination,* ***CIA*** *- Continuous Internal Assessment (It consists of Assignments/Seminars/Presentations/MCQ Tests, etc.))*

Course Content

Unit No.	Topics	Teaching Hours	Weightage	Mapping with CO
1	**Overview and concepts Data Warehousing and Business Intelligence** Why reporting and Analysing data, Raw data to valuable Information-Lifecycle of Data - What is Business Intelligence - BI and DW in today's perspective - What is data warehousing - The Building Blocks: Defining Features - Data warehouses and data 1marts - Overview of the components - Metadata in the data warehouse - Need for data warehousing - Basic elements of data warehousing - trends in data warehousing.	5	12**%**	CO1
2	**The Architecture of BI and DW** BI and DW architectures and its types - Relation between BI and DW - OLAP (Online analytical processing) definitions - Difference between OLAP and OLTP - Dimensional analysis - What are cubes? Drill-down and roll-up - slice and dice or rotation - OLAP models - ROLAP versus MOLAP - defining schemas: Stars, snowflakes and fact constellations	7	16**%**	CO3
3	**Introduction to data mining (DM)** Motivation for Data Mining - Data Mining-Definition and Functionalities – Classification of DM Systems - DM task primitives - Integration of a Data Mining system with a Database or a Data Warehouse - Issues in DM – KDD Process	4	08%	CO1
4	**Data Pre-processing** Why to pre-process data? - Data cleaning: Missing Values, Noisy Data - Data Integration and transformation - Data Reduction: Data cube aggregation, Dimensionality reduction - Data Compression - Numerosity Reduction - Data Mining Primitives - Languages and System Architectures: Task relevant data - Kind of Knowledge to be mined - Discretization and Concept Hierarchy.	7	16%	CO2
5	**Concept Description and Association Rule Mining** What is concept description? - Data Generalization and summarization-based characterization - Attribute relevance - class comparisons Association Rule Mining: Market basket analysis - basic concepts - Finding frequent item sets: Apriori algorithm - generating rules – Improved Apriori algorithm – Incremental ARM – Associative Classification – Rule Mining	7	16%	CO3
6	**Classification and Prediction** What is classification and prediction? –	7	16%	CO2

	Issues regarding Classification and prediction: •Classification methods: Decision tree, Bayesian Classification, Rule based, CART, Neural Network •Prediction methods: Linear and nonlinear regression, Logistic Regression Introduction of tools such as DB Miner /WEKA/DTREG DM Tools			
7	**Data Mining for Business Intelligence Applications** Data mining for business Applications like Balanced Scorecard, Fraud Detection, Clickstream Mining, Market Segmentation, retail industry, telecommunications industry, banking & finance and CRM etc.	4	08%	CO4
8	**Advance topics** Introduction and basic concepts of following topics. Metarelational Data Mining, Clustering, Spatial mining, web mining, text mining, Ensemble Classifier (Multiple Classifier, Bagging, Boosting, Stacking), Incremental learning	4	08%	CO5

Suggested Distribution of Theory Marks Using Bloom's Taxonomy						
Level	Remembrance	Understanding	Application	Analyse	Evaluate	Create
Weightage	**40**	**20**	**20**	**10**	**-**	**10**

NOTE: This specification table shall be treated as a general guideline for the students and the teachers. The actual distribution of marks in the question paper may vary slightly from above table.

Suggested List of Experiments/Tutorials

Sr. No.	Name of Experiment/Tutorial	Teaching Hours
1	To implement classification using Weka tool.	2
2	To implement association rule using Weka and Tanagra.	2
3	To implement data pre-processing using different tools.	2
4	To Study R Programming tool.	2
5	Implement k-means clustering and find the outliers using R tools.	2
6	To find the outliers using R programming	2
7	Design and Create cube by identifying measures and dimensions for Star Schema, Snowflake schema	2
8	Design and Create cube by identifying measures and dimensions for Design storage for cube using storage mode MOLAP, ROLAP and HOLAP.	2
9	Process cube and Browse cube data a. by replacing a dimension in the grid, filtering and drilldown using cube browser. b. browse dimension data and view dimension members, member properties, member	2

	property values. c. create calculated member using arithmetic operators and member property of dimension member.	
10	Create and use Excel Pivot Table report based on data cube using SQL Server.	2

Reference Books

Sr. No.	Name of Reference Books
1	J. Han, M. Kamber, "Data Mining Concepts and Techniques", Morgan Kaufmann
2	M. Kantardzic, "Data mining: Concepts, models, methods and algorithms, John Wiley &Sons Inc.
3	Paulraj Ponnian, "Data Warehousing Fundamentals", John Willey
4	M. Dunham, "Data Mining: Introductory and Advanced Topics", Pearson Education.
5	G. Shmueli, N.R. Patel, P.C. Bruce, "Data Mining for Business Intelligence: Concepts, Techniques, and Applications in Microsoft Office Excel with XLMiner", Wiley India.