**Week 1: MSDS655 Business Intelligence and Analytics Final Exam**

1. Differences between DSS, BI, and BI Analytics:

Decision Support Systems (DSS) assist in decision-making with interactive tools using data analysis and models, useful for tasks like financial planning. Business Intelligence (BI) collects and analyzes business data to present insights, using tools like reporting and dashboards for trend analysis and performance monitoring. Business Intelligence Analytics enhances BI by using advanced techniques like predictive modelling and machine learning for deeper insights and future predictions, aiding in tasks like forecasting and fraud detection.

2.Descriptive, Predictive, and Prescriptive Analytics:

Descriptive analytics summarizes past data to understand business performance, such as a sales dashboard showing revenue and units sold. Predictive analytics uses historical data to forecast future outcomes, like a model predicting customer churn to help reduce cancellations. Prescriptive analytics recommends actions based on predictions, such as a supply chain system optimizing inventory levels and distribution routes to improve efficiency and profitability.

**Week 2: MSDS655 Business Intelligence and Analytics Final Exam**

1. Use Cases for Big Data/Hadoop and Data Warehousing/RDBMS:

Big Data/Hadoop is ideal for processing large volumes of diverse data, building data lakes, real-time analytics, and machine learning applications. For example, it's used for analyzing log files, social media data, and IoT device monitoring. Data warehousing/RDBMS, on the other hand, is best for structured data, business intelligence, and reporting. It supports OLAP operations, data integration, and regulatory compliance, making it suitable for generating reports, creating dashboards, and ensuring data quality.

2. The Future of Data Warehousing in the Era of Big Data:

Data warehousing is unlikely to become obsolete despite the rise of Big Data. These technologies are complementary rather than competitive. Data warehousing excels in handling structured data for business intelligence, while Big Data platforms manage diverse and large datasets. Organizations often use both technologies together, integrating traditional data warehousing with Big Data solutions to meet various data management needs. Established investments and evolving technologies also support the continued relevance of data warehousing alongside Big Data advancements.

**Week 3: MSDS655 Business Intelligence and Analytics Final Exam**

1. Components of a Data Warehouse:

A data warehouse integrates and stores data from various sources for analysis and reporting. It includes:

Source System: Where data originates, such as transactional databases and spreadsheets.  
ETL Environment: Extracts data from sources, transforms it into a usable format, and loads it into the warehouse.  
BI Environment: Tools for querying, analysing, and visualizing data.  
Target System: The data warehouse itself, structured to support reporting and decision-making.

2. Operational vs. Decision Support Data:

Operational data supports daily activities with real-time details like sales transactions. Decision support data, used for strategic analysis, is summarized and historical.  
Fact Table Attributes: Numeric measures like sales revenue.  
Dimension Table Attributes: Descriptive fields like product names.

3. Star Schema:

A star schema includes a central fact table surrounded by dimension tables.

Example: Fact Table: Sales  
Attributes: Date Key, Product Key, Customer Key, Sales Amount, Quantity Sold  
Dimension Tables:  
Date Dimension: Date Key, Date, Day of Week, Month, Quarter, Year  
Product Dimension: Product Key, Product ID, Product Name, Category, Brand, Unit Price  
Customer Dimension: Customer Key, Customer ID, Customer Name, Gender, Age, City, State

Advantages:  
Simplifies data navigation and query performance.  
Supports scalability and enhances data analysis capabilities.

**Week 4: MSDS655 Business Intelligence and Analytics Final Exam**

1. Data Pre-processing in Data Mining:

Data mining processes, like CRISP-DM, involve several key steps:

* Business Understanding: Define goals and requirements.
* Data Understanding: Explore and assess data quality.
* Data Preparation: Clean, transform, integrate data.
* Modelling: Select and build data mining models.
* Evaluation: Assess model performance.
* Deployment and Monitoring: Deploy models and monitor performance.

Data pre-processing steps include cleaning, integration, transformation, reduction, discretization, and normalization to ensure data quality and suitability for analysis.

1. Value of Data Mining Tools:

Data mining tools extract insights from data:

* Pattern Discovery: Find hidden patterns.
* Predictive Analysis: Forecast future outcomes.
* Segmentation: Customize strategies for target groups.
* Optimization: Improve processes and resource allocation.
* Fraud Detection: Identify anomalies and potential fraud.
* Decision Support: Provide insights for informed decisions.
* Customer Insights: Understand preferences and behaviors.
* Research and Development: Facilitate discoveries and advancements.

Data mining tools enhance decision-making, operational efficiency, customer satisfaction, and innovation across industries.

1. Privacy Concerns in the Big Data Movement:

The Big Data movement raises privacy issues:

* Consent and Transparency: Ensure clear consent and transparency in data collection practices.
* Data Security: Protect against breaches and unauthorized access.
* Bias and Fairness: Address biases and ensure fairness in data analysis.

**Week 5: Text Analytics, Text Mining, Sentiment Analysis, Web Analytics, Web Mining and Social Analytics**1. Predicting Financial Markets with Sentiment Analysis:

Sentiment analysis predicts financial markets by analyzing sentiments from news, social media, and financial reports. It gauges sentiment around stocks, detects events impacting markets, forecasts trends, manages risks, informs algorithmic trading, and serves as contrarian indicators. Integrating sentiment analysis with financial analysis enhances decision-making, though its limitations should be noted for comprehensive analysis.

2. Relationships between Web Analytics, Text Mining, and Sentiment Analysis:

Web analytics, text mining, and sentiment analysis leverage digital data to extract insights:  
Data Source: Web analytics from website interactions, text mining from textual data like reviews, and sentiment analysis from sentiment in texts.

Data Preprocessing: Text mining and sentiment analysis use NLP for text preprocessing; web analytics preprocess data for accuracy.  
Content Analysis: Text mining and sentiment analysis extract themes and sentiment; web analytics analyse user behaviour.  
Integration: Combining insights enriches understanding; sentiment analysis of reviews informs web analytics for marketing and product decisions.  
Predictive Analysis: Predicts user behaviour and sentiment trends; web analytics predicts website metrics.

**Week 6: Prescriptive Analytics - Model Based Decision Making, Modeling, and Analysis**

1.Components of Linear Programming (LP):

Linear programming (LP) comprises an objective function (maximized or minimized), constraints (linear equations or inequalities), and decision variables (controlled to optimize the objective). Used in operations research, finance, and engineering for efficient decision-making and problem-solving.

2. Roles of Decision Variables, Intermediate Result Variables, and Result Variables:

Decision variables are controlled to optimize objectives. Intermediate result variables aid in problem formulation, while result variables represent the optimized solution's outcomes, guiding decision-makers in strategy and evaluation.

3.Characteristics of LP and Solving Allocation Problems:

LP optimizes linear objective functions with linear constraints, ensuring proportionality and non-negativity. Solves allocation problems by formulating them as LP models, optimizing resource usage under constraints to achieve desired goals effectively and efficiently.

4. Comparison of Common Optimization Models:  
  
Linear Programming (LP): Optimizes linear objectives with linear constraints, ideal for resource allocation and logistics.  
Integer Programming (IP): Extends LP by restricting variables to integers, useful for discrete decisions like scheduling and project management.  
Mixed Integer Linear Programming (MILP): Integrates LP and IP, accommodating both continuous and discrete variables in complex optimization problems.  
Quadratic Programming (QP): Optimizes quadratic objectives with linear constraints, suited for portfolio optimization and non-linear relationships.  
Nonlinear Programming (NLP): Handles non-linear objectives and constraints, crucial for complex engineering designs and process optimizations.

**Week 7: Prescriptive Analytics (continued) - Automated Decision Systems, Expert Systems, Knowledge Management, and the Tableau Toolset**

1. Why are expert systems important for companies to capture knowledge?

Expert systems are crucial for companies because they systematize and preserve expert knowledge within the organization. This helps retain critical knowledge, share it across the company, support decision-making, facilitate training, ensure consistency, promote continuous improvement, and enhance scalability and accessibility.

2. Explain how Tableau is different from RapidMiner.

Tableau focuses on creating interactive visualizations and dashboards without needing programming skills. It's ideal for business users to explore and communicate insights visually. RapidMiner, on the other hand, is a comprehensive data science platform used by analysts and data scientists for data preprocessing, machine learning, and predictive modeling. It requires more technical expertise but offers extensive capabilities for advanced analytics.

**Week 8: Business Analytics - Emerging Trends and Future Impacts**

1. Define social network:

A social network is a structure of individuals or organizations connected through relationships, interactions, or affiliations. These connections are based on factors like friendships, professional ties, common interests, or shared activities. Social networks can be online (e.g., Facebook), offline (e.g., clubs), professional (e.g., business associations), or biological (e.g., brain neurons). Social network analysis (SNA) studies these connections to understand interaction patterns, information flow, influence, and behaviour.

2. List the impacts of analytics on decision making:  
  
Enabling data-driven decisions for accuracy and effectiveness.  
Improving efficiency by identifying inefficiencies and optimizing processes.  
Enhancing risk management through data analysis and predictive insights.  
Providing customer insights for personalized strategies and loyalty.  
Facilitating strategic planning with predictive models and trend analysis.  
Monitoring performance and evaluating strategies for continuous improvement.  
Driving innovation, competitive advantage, and cost optimization through data-driven insights.

3.Define cloud computing:

Cloud computing delivers computing services over the internet on a pay-as-you-go basis. It offers access to a shared pool of resources (servers, storage, etc.) that can be rapidly scaled. Key characteristics include on-demand self-service, broad network access, resource pooling, rapid elasticity, and metered service billing. Deployment models include public, private, hybrid, and multi-cloud, each offering different levels of control, security, and scalability.

Feedback on the BI course:

- Helpful: The structured learning plan and engaging discussions.

- Useless: all parts of the course valuable.