COURSE 12 B: BUSINESS INTELLIGENCE TOOLS AND DATA VISUALIZATION

Theory	Credits: 3	3 hrs/week

Course Objectives

This course is designed to:

- Develop student understanding of Business Intelligence (BI) principles and decision support systems.
- Train students in Advanced Excel for data analysis and visualization.
- Impart working knowledge of Tableau for real-time data visualization and dashboards.
- Equip learners with hands-on skills to analyze, interpret, and communicate data.
- Integrate BI tools for business forecasting, decision-making, and storytelling.

Course Outcomes

By the end of this course, the student will be able to:

CO1: Describe the framework, scope, and applications of Business Intelligence.

CO2: Analyze business datasets using advanced Excel functions like pivot tables, Power Query, and dashboards.

CO3: Visualize data interactively using Tableau and build industry-grade dashboards.

CO4: Apply BI tools to different business domains (Finance, Marketing, HR, Operations).

CO5: Present analytical findings to stakeholders using compelling data storytelling techniques.

SYLLABUS

Unit I: Introduction to Business Intelligence and Data-Driven Decisions

Meaning and Definition of Business Intelligence – Evolution of BI – Role in Managerial Decision Making – BI Architecture – Data Warehousing Basics – Data Marts – OLAP vs OLTP – BI Applications in Functional Areas – Business Metrics and KPIs – Data-Driven Culture.

Unit II: Business Intelligence with Advanced Excel – Part I

Introduction to Excel for BI – Data Types – Data Cleaning Using Flash Fill, Text Functions, Remove Duplicates – Logical Functions (IF, AND, OR, Nested IF) – Lookup Functions (VLOOKUP, HLOOKUP, XLOOKUP, INDEX & MATCH) – Sorting and Filtering – What-If Analysis – Data Validation.

Unit III: Business Intelligence with Advanced Excel – Part II

Pivot Tables and Pivot Charts – Slicers and Timelines – Power Query and Power Pivot – Creating Dashboards in Excel – Forecasting Using Excel – Goal Seek and Solver – Scenario Analysis – Macro Basics – KPI Tracking Templates – Interpreting Excel BI Outputs.

Unit IV: Business Intelligence with Tableau – Part I

Getting Started with Tableau – Connecting to Data Sources – Data Types and Dimensions/Measures – Simple Visualizations (Bar, Line, Pie, Map, Scatter) – Filters, Sorting, Grouping – Calculated Fields – Parameters – Basic Dashboard Creation – Story Points.

Unit V: Business Intelligence with Tableau – Part II

Interactive Dashboards – Dual-Axis Charts – Forecasting in Tableau – Trend and Reference Lines – Real-time Data Streams – Tableau Public vs Desktop – BI Case Studies Using Tableau

in Marketing, HR, and Finance – Exporting and Publishing Dashboards – Data Storytelling and Presentation Skills.

Student-Centric Activities
- Excel Dashboard Project: Students will create an interactive dashboard using Excel (Pivot Tables, Charts, Slicers, Power Query) to visualize sales, HR, or financial data for a fictional company.
- Tableau Data Storytelling Challenge: Students will import a dataset into Tableau (e.g., from Kaggle or Data.gov) and build a multi-chart visualization, interpreting trends and patterns for decision-making.
- Live Case Analysis Using BI Tools: Analyze a real-time business problem (e.g., declining sales in a region) using Excel analytics or Tableau, and present visual insights with actionable recommendations.
- Data Cleaning & Preparation Drill: Students will be given a messy dataset and must use Excel functions (Power Query, Text to Columns, Flash Fill, Remove Duplicates) to clean it for analysis.
- Group Presentation: BI in Industry: Each group researches and presents how business intelligence tools are used in sectors like healthcare, retail, banking, or logistics (with example dashboards).

Reference Books

1. Sharda, R., Delen, D., & Turban, E. (2020). *Business Intelligence, Analytics, and Data Science: A Managerial Perspective* (5th ed.). Pearson.
2. Murray, D. (2016). *Tableau Your Data!: Fast and Easy Visual Analysis with Tableau Software*. Wiley.
3. Kusleika, D. (2022). *Excel 2021 Power Programming with VBA*. Wiley.
4. Alexander, M., & Walkenbach, J. (2021). *Excel Dashboards and Reports* (4th ed.). Wiley.
5. McKinney, W. (2022). *Data Science for Business Intelligence with Excel and Tableau*. O'Reilly Media.

COURSE 12 B: BUSINESS INTELLIGENCE TOOLS AND DATA VISUALIZATION

Practical	Credits: 1	2 hrs/week

To complement theoretical understanding, the following hands-on practical exercises are proposed:

1. **Interactive Excel Dashboards:**
   - Create dashboards using Pivot Tables, Pivot Charts, Slicers, and Timelines to analyze multi-dimensional data (e.g., regional sales, HR turnover, product profitability).
   - Use Power Query for importing and transforming raw datasets.

2. **Advanced Excel BI Simulations:**
   - Practice What-If Analysis, Goal Seek, and Solver for business decision problems (e.g., breakeven analysis, loan repayment planning).
   - Build KPI templates and use conditional formatting for performance visualization.

3. **Tableau Visualization Lab:**
   - Connect Tableau to various data sources (Excel, CSV, Google Sheets).
   - Develop visualizations such as dual-axis charts, maps, and trend lines.
   - Build and publish dashboards using filters, parameters, and story points.

4. **BI Mini Project:**
   - Teams develop a BI project analyzing sectoral data (e.g., Retail, Banking, Healthcare) and present insights using Tableau dashboards and Excel analytics.
   - Include executive summary, KPIs tracked, and business recommendations.

5. **Real-Time Case-Based BI Analysis:**
   - Use a case scenario (e.g., employee attrition or customer churn) and apply both Excel and Tableau to derive insights.
   - Evaluate data cleanliness, visualization effectiveness, and decision relevance.