

**ANDHRA PRADESH STATE COUNCIL OF HIGHER EDUCATION****Programme B.B.A. Business Analytics (Major)****W.E.F AY 2023-24****COURSE STRUCTURE**

<b>Semester</b>	<b>Course Number</b>	<b>Course Name</b>	<b>No of Hrs/Week</b>	<b>No of Credits</b>
<b>Semester - I</b>	<b>1</b>	Fundamentals of Commerce	4	4
	<b>2</b>	Business Organization	4	4
<b>Semester - II</b>	<b>3</b>	Statistical Methods	4	4
	<b>4</b>	Introduction to Business Analytics	4	4
<b>Semester - III</b>	<b>5</b>	Data Analysis with MS Excel	4	4
	<b>6</b>	Data Base Management Systems	4	4
	<b>7</b>	Business Analytics Programming	4	4
	<b>8</b>	Data Mining & Data Warehousing	4	4
<b>Semester - IV</b>	<b>9</b>	Data Visualization tools - MS Power BI	4	4
	<b>10</b>	Data Analysis with Python	4	4
	<b>11</b>	Big Data Analytics	4	4
<b>Semester - V</b>	<b>12</b>	Business Analytics for Decision Making	4	4
	<b>13</b>	Data Analysis with R	4	4
	<b>14</b>	Data Visualization with Tableau	4	4
	<b>15</b>	Web Analytics	4	4

## STATISTICAL METHODS

### UNIT I:

**Measures of Central Tendency:** Introduction, Arithmetic mean, geometric mean, harmonic mean, median, mode. **Measures of Dispersion:** Introduction, Range, Quartile deviation, Mean deviation, Standard deviation, combined mean and combined standard deviation.

**UNIT II: Correlation Analysis:** Introduction, types of correlation, Methods of Correlation analysis, Scatter diagram method, Karl Pearson's correlation coefficient, Coefficient of determination, Spearman's rank correlation coefficient.

**Regression Analysis:** Introduction, Types of regression models, Significance of Regression Analysis, Methods of finding Regression Equations, Least Squares and Using Regression Coefficient methods, Prediction using the Regression Equations.

**UNIT III: Probability** – Definitions of various terms, Types of probability, Bayes' Theorem. Random variable and Probability Distribution – Definition, Probability distribution of discrete and continuous random variable, Mean and Variance.

**Discrete distribution** – Introduction, Binomial distribution, Poisson distribution, Mean and Variance.

**Continuous distribution**– Normal distribution, Properties of Normal distribution, Area under Standard Normal Probability Curve and Importance of Normal Distribution.

### UNIT IV:

**Index numbers,** Introduction, Characteristics and Uses of index numbers, Types of Index Numbers, Laspyre, Paasche's, Fisher's, Marshall-Edgeworth, Dorbish and Bowley, Limitations of index numbers.

**UNIT V: Time series analysis** – Introduction, Components of a time series – Secular trend, Short term, Random or Irregular variations, Measurement of trend – Free hand method, Method of linear Curve fitting by the principle of least squares, Method of Semi - Averages and Moving average.

### REFERENCE BOOKS

1. Gupta, S.C. & Gupta, I. (2012), Business Statistics, Mumbai: Himalaya Publishing House.
2. Levine, D.M., Berenson, M. L. & Stephan, D. (2012), Statistics for managers using Microsoft Excel, New Delhi: Prentice Hall India Pvt.
3. Aczel, A. D. & Sounderpandian, J. (2011), Complete Business Statistics, New Delhi: Tata McGraw Hill.
4. Anderson, D., Sweeney, D., Williams, T., Camm, J., & Cochran, J. (2013), Statistics for Business and Economics, New Delhi: Cengage Learning.
5. Davis, G., & Pecar, B. (2014), Business Statistics using Excel, New Delhi: Oxford University Press.

# **Introduction to Business Analytics**

## **Unit-1 Introduction to Business Analytics**

Concept of analytics, Types of Analytics, Application fields - Marketing Analytics, Finance Analytics, HR Analytics, Operation Analytics, organization and source of data, importance of data quality, dealing with missing or incomplete data, Role of Data Scientist in Business & Society

## **Unit-2 Data Bases, Data Warehousing and Data Mining**

Types of Data Sources- Structured Vs Semi structured Vs Unstructured data, Data Warehouse Vs Databases, Relational Database vs Non-Relational Database, RDBMS Data structures, Columnar Data structures. Data Mining meaning, Association Rules and clustering, Decision trees, Random forests

## **Unit-3 Analytics Methodology**

Introduction to Analytics Methodology, preparing objectives & identifying data requirements, Data Collection, Understanding data, Data preparation – Data Cleansing, Normalisation, Data preparation, Data Blending, Data Modelling, Evaluation & feedback

## **Unit-4: Visualisation of Data**

Introduction, Data summarization methods; Tables, Graphs, Charts, Histograms, Frequency distributions, Relative Frequency Measures of Central Tendency and Dispersion; Box Plot; Basic probability concepts, conditional probability, Probability distributions, Continuous and discrete distributions, sequential decision making.

## **Unit-5: Predictive Analysis**

Simple linear regression: coefficient of determination, significance tests, residual analysis, confidence and prediction intervals. Multiple linear regression: coefficient of multiple coefficient of determination, interpretation of regression coefficients, categorical variables, heteroscedasticity, multi-collinearity, outliers, autoregression and transformation of variables.

### **Text Books And Reference Books:**

Turban E, Armson, JE, Liang, TP & Sharda, Decision support and Business Intelligence Systems, 8th Edition, John Wiley & Sons, 2007

Frank J. Ohlhorst, Big Data Analytics, 1st Edition, Wiley, 2012.

Efraim Turban, Ramesh Sharda, Jay Aronson, David King, Decision Support and Business Intelligence Systems, 9th Edition, Pearson Education, 2009



## **DATA ANALYSIS WITH MS EXCEL**

**Unit – I: Introduction to Business Analytics:** Benefits of Business Analytics, Types of Data – Structured, Semi Structured and Unstructured, Application areas of Business Analytics, Categorization of Analytical methods and models – Descriptive, Diagnostic, Predictive and Prescriptive

**UNIT – II: Working with MS Excel:** Uses of Excel, Working with MS Excel Workbook, Worksheet Management, Sorting, Filters, Conditional Formatting, Working with Charts, Trend lines

**Unit – III: Working with Excel Functions:** Text Functions, Logical Functions, Lookup Functions, Math Statistical Functions

**UNIT – IV: Statistical Analysis with Excel:** Working with Statistical Functions, Descriptive Statistics in Excel, Using Data Analysis Tool pack in Excel

**UNIT V:What if Analysis and Pivot Tables:** Data Tables, Scenario Manager, Goal Seek, Creating PivotTables, Working with Pivot Charts, Working with Power Pivot

### **Reference Book(s):**

Wayne L. Winston, Microsoft Excel – Data Analysis and Business Modeling, Prentice Hall of India

Paul Mcfedris, Excel Data Analysis Visual Blueprint, Wiley

## **DATABASE MANAGEMENT SYSTEMS**

**Unit - I: Database approach:** Features of database approach, advantages and disadvantages, Components of DBMS, Data Models

-Hierarchical, Network, Relational, ER analysis, Attributes and Domains, Integrity Constraints and Keys, Normalization – 1NF, 2NF, 3NF,

**Unit – II: Working with MS Access:** Creating Tables, Data Types and Fields properties in MS Access, Creating Relationships, Designing Forms for Data Entry, Queries in MS Access – Simple queries, Cross-tab queries, Reports in MS Access – Simple reports, cross tab reports - using report wizard, using query design

**Unit - III: Working with SQL:** DDL statements - Create, Drop, Alter, DML statements, Insert, Select, Delete, Update, Oracle Functions, Join Condition, Set Operators, The Order By Clause

**Unit - IV: Working with PL/SQL:** Control Structures, PL/SQL Block, Cursors, Procedures, Functions, Triggers

**Unit – V: Query Processing and Optimization:** ACID properties, Transaction Processing and Concurrency Control - Database Recovery.

### **Reference Books:**

1. Abraham Silberschatz, Henry F Korth, Database System Concepts, McGraw Hill Education

Hoffer Jeffrey, V. Ramesh, TopiHeikki, Modern Database Management, Pearson 3. Andrew Couch, Microsoft Access Plain & Simple

## **BUSINESS ANALYTICS PROGRAMMING**

**UNIT 1 INTRODUCTION TO DATABASE MANAGEMENT SYSTEMS** – Definition, What is MySQL?MySQL Installer, Download sample Database, Loading Sample Database, Structured Query Language, Data types.

**UNIT 2 DATA DEFINITION AND MANIPULATION:** Creating Table, Data Integrity, Creating constraints, Querying Database, Retrieving result sets, Functions and Joins, Sub Queries.

**UNIT 3 BASICS OF SAS:** Introduction to SAS, Installation of SAS university Edition, prerequisites for data analysis using SAS, SAS architecture, Data Types, formats and informats, SAS coding- Data step and proc step, libraries, Importing external data, Reading and manipulating Data, functions, Data Transformations, Conditional Statements.

**UNIT 4 PYTHON:** Basics of Python – various tools, Installation of Anaconda Navigator, Data types – string, tuples, set, lists, dictionary, Arrays. Spyder and Documentation with Jupyter.

**UNIT 5 R- PROGRAMMING:** Basics of R, Installation of R studio, Vectors, Matrices, Data types, Importing files, Writing files, Merging Files, Data Manipulation and Data Cleaning, Functions

### **Reference Books**

1. "Learning Python", David Ascher and Mark Lutz
2. "Python for Data Analysis: Data Wrangling with Pandas, NumPy, and IPython", Wes McKinney
3. "Introduction to Machine Learning with Python: A Guide for Data Scientists", Andreas C. Muller and Sarah Guido
4. "R Cookbook", Paul Teetor 2. "R for Data Science", Garrett Golemund and Hadley Wickham 3. "Hands-On Programming with R", Garrett Golemund

## **Data mining & Data Ware Housing**

### **Unit I**

Introduction to Data Mining, Fundamentals of data mining, data mining functionalities, data and attribute types, statistical description of data

Data Pre-processing:

Data cleaning, data integration, data reduction, data transformation and data discretization

### **Unit II**

Data Warehousing: Basic concepts, data ware house modeling data cube and OLAP, data warehouse design and implementation.

### **Unit III**

Mining Frequent Patterns and Associations: Basic methods, frequent Item set mining methods any two algorithms, pattern evaluation methods.

### **Unit IV**

Classification: Basic concepts, decision tree induction, Bayes classification, any two advanced methods, model evaluation.

### **Unit V**

Cluster Analysis: Basic concepts, clustering structures, major clustering approaches, partitioning methods, hierarchical methods, density based methods, the expectation maximization method, cluster based outlier detection Essential Reading.

### **References:**

1. Data Mining by VikramPudi, P.Radha Krishna, Oxford Universith Press
2. Data Warehousing by ReemaThareja , Oxford University Press
3. J. Han , M. Kamber and J. Pei , Data Mining: Concepts and Techniques , 3rd.edMorgan Kaufmann, 2011
4. Introduction to data mining –G.K.Gupta, PHI
5. 3.Data mining, Data warehouse &Olap-Berson, Tata McGraw Hill



## Data Visualization Tools - MS Power BI

**Unit – 1 Introduction** Introduction To Power BI – Need, Importance Power BI – Advantages And Scalable Options History – Power View, Power Query, Power Pivot Power BI Data Source Library And DW Files Cloud Collaboration And Usage Scope Business Analyst Tools, MS Cloud Tools Power BI Installation And Cloud Account Power BI Cloud And Power BI Service Power BI Architecture And Data Access OnPremise Data Access And Microsoft On Drive Power BI Desktop – Installation,

**Unit – 2 Reports & Auto filters** Report Design With Legacy & .DAT Files Report Design With Database Tables Understanding Power BI Report Designer Report Canvas, Report Pages: Creation, Renames Report Visuals, Fields And UI Options Experimenting Visual Interactions, Advantages Reports With Multiple Pages And Advantages Pages With Multiple Visualizations. Data Access PUBLISH Options And Report Verification In Cloud “GET DATA” Options And Report Fields, Filters Report View Options: Full, Fit Page, Width Scale Report Design Using Databases & Queries Query Settings And Data Preloads Navigation Options And Report Refresh Stacked Bar Chart, Stacked Column Chart Clustered Bar Chart, Clustered Column Chart Adding Report Titles. Report Format Options Focus Mode, Explore And Export Settings

**Unit-3 Visualization Power BI Design:** Canvas, Visualizations And Fields Import Data Options With Power BI Model, Advantages Direct Query Options And Real-Time (LIVE) Data Access Data Fields And Filters With Visualizations Visualization Filters, Page Filters, Report Filters Conditional Filters And Clearing. Testing Sets Creating Customised Tables With Power BI Editor General Properties, Sizing, Dimensions, And Positions Alternate Text And Tiles. Header (Column, Row) Properties Grid Properties (Vertical, Horizontal) And Styles Table Styles & Alternate Row Colors – Static, Dynamic Sparse, Flashy Rows, Condensed Table Reports. Focus Mode Totals Computations, Background.

**Unit-4 Advance Visualization tools:** CHART Report Types And Properties Stacked Bar Chart, Stacked Column Chart Clustered Bar Chart, Clustered Column Chart 100% Stacked Bar Chart, 100% Stacked Column Chart Line Charts, Area Charts, Stacked Area Charts Line And Stacked Row Charts Line And Stacked Column Charts Waterfall Chart, Scatter Chart, Pie Chart Field Properties: Axis, Legend, Value, Tooltip Field Properties: Color Saturation, Filters Types Formats: Legend, Axis, Data Labels, Plot Area Data Labels: Visibility, Color And Display Units Data Labels: Precision, Position, Text Options Analytics: Constant Line, Position, Labels Working With Waterfall Charts And Default Values Modifying Legends And Visual Filters – Options Map Reports: Working With Map Reports Hierarchies: Grouping Multiple Report Fields Hierarchy Levels And Usages In Visualizations Preordered Attribute Collection – Advantages Using Field Hierarchies With Chart Reports Advanced Query Mode @ Connection Settings – Options Direct Import And InMemory Loads, Advantages

**Unit-5 Data Management with hierarchies & drill down:** Hierarchies And Drilldown Options Hierarchy Levels And Drill Modes – Usage Drill-Thru Options With Tree Map And Pie Chart Higher Levels And Next Level Navigation Options Aggregates With Bottom/Up Navigations. Rules Multi Field Aggregations And Hierarchies In Power BI Drilldown, Show next level, Expand to next level, See Data And See Records Options. Differences Toggle Options With Tabular Data. Filters Drilldown Buttons And Mouse Hover Options @ Visuals Dependant Aggregations, Independent Aggregations Automated Records Selection With Tabular Data Report Parameters : Creation And Data Type Available Values And Default Values. Member Values Parameters For Column Data And Table / Query Filters Parameters Creation – Query Mode, UI Option Linking Parameters To Query Columns –



Options Edit Query Options And Parameter Manage Entries Connection Parameters And Dynamic Data Sources Synonyms – Creation And Usage Options

**Textbooks:**

1. Microsoft Power BI Dashboards Step by Step, First Edition, By Pearson
2. Analyzing Data with Microsoft Power BI and Power Pivot for Excel. by Ferrari Alberto , Russo Marco, PHI LEARNING PVT. LTD. | MICROSOFT PRESS

**Reference Books:**

1. Mastering Microsoft Power BI: Expert techniques for effective data analytics and business intelligence, brettpowell ,Packt Publishing
2. Microsoft Power BI Complete Reference: Bring your data to life with the powerful features of Microsoft Power BI, by Devin Knight, Brian Knight, Mitchell Pearson, Manuel Quintana, Brett Powell, Packt Publishing Limited.

## DATA ANALYSIS WITH PYTHON

**UNIT-I: Introduction:** Features of Python, Setting up path, Variables and Data types, Operators in Python, Input – Output Statements, Control Structures: Conditional Statements, Looping Statements, Control Statements

**UNIT-II: Data Structures of Python:** Strings, Lists, Tuples, Dictionaries, Functions: Defining and calling a function, Types of Function; Modules: Importing Module, Packages, Composition, Exception Handling. **OOP Concepts and Regular Expressions:** OOP concepts in Python, Regular Expressions: Match Function, Search Function, Matching Vs Searching, Modifiers, Patterns, Working with Database.

**UNIT-III: Python for Data Analysis - I:** NumPy Basics: Arrays and Vectorized Computation, Pandas Basics: Working with Series and DataFrame; Scipy Basics: Random Variables, Building specific distributions, Univariate analysis, Bivariate and multivariate analysis.

**UNIT-IV: Python for Data Analysis- I:** Pandas for Data Analysis: I/O tools; Series, Data frames, arrays, Indexing & selecting data, Merge, Join and Concatenate; Reshaping and Pivot tables; Working with missing data; Working with numerical and categorical data.

**UNIT-V: Advanced Visualizations:** Python packages for plotting and visualizations; Introduction to Matplotlib package; Subplots, axes and figures; Text, Labels and Annotations; Managing colors; Working with lines, dates and text on plots; Scatter plots; Pie and Polar charts; Bar charts and Histograms; Plotting discrete distributions; Plotting categorical variables; Plotting images, contours and fields; Visualizations for statistics; Animations.

### Reference Books:

1. Starting Out with Python (2009) Pearson , Tonny Gaddis
2. Beginning Python Wrox Publication Peter Norton, Alex Samuel
3. Python Algorithms Apress, Magnus Lie Hetland
4. Python Object Oriented Programming PACKT Press, Dusty Phillips

## **BIG DATA ANALYTICS**

**UNIT-I: Introduction to Big Data:** Concept, Features of big data, big data challenges, Hadoop and its features, Hadoop Ecosystem, Hadoop Components, Hadoop Architecture, Hadoop Cluster, Hadoop Storage: HDFS

**UNIT-II: HadoopMapreduce:** Concept, YARN components, YARN architecture, YARN mapreduce application execution flow, YARN workflow, Java for Mapreduce programming; Mapreduce examples; Mapreduce for data analytics: analyzing numerical and categorical data sets; Mapreduce for statistical analysis; Hadoop streaming.

**UNIT-III: Apache PIG:** PIG Components & Execution, PIG data types, Data models in PIG, Programming in PIG.

**UNIT-IV: APACHE HIVE & HBase:** Introduction, Architecture and components, data types and data models, HIVE partitioning and bucketing, HIVE tables, HIVE QL: joining tables, dynamic partitioning. Introduction, Architecture and components, Run modes, configuration, data models, HIVE data loading techniques,

**UNIT – V: Introduction to Apache Spark:** Interactive analysis, RDD programming; Spark SQL, Data sets and Data Frames; Basics of MLib and GraphX

### **Reference Books**

1. Mike Frampton, "Mastering Apache Spark", Packt Publishing
2. TomWhite, "Hadoop:TheDefinitiveGuide", O'Reilly, 4th Edition
3. Nick Pentreath, Machine Learning with Spark, Packt Publishing
4. Mohammed Guller, Big Data Analytics with Spark, Apress
5. Donald Miner, Adam Shook, "Map Reduce Design Pattern", O'Reilly



## **Business Analytics for Decision making**

**Unit 1. Introduction to fundamental concepts of business analytics** Introduction to Business Data Analytics: Definition -Data Analytics as a Movement, Data Analytics as a Decision-making Paradigm - Data Analytics as a Set of Practices and Technologies - Business Data Analytics Objectives - Why Are Business Analytics Important Role of Business Analytics -Types of analytics methods: Business Analysis and Business Data Analytics -What Are Descriptive Analytics -What Are Predictive Analytics? -Diagnostic Analytics What Are Prescriptive Analytics?

**Unit 2 Business Data Analytics Process** Business Data Analytics Process:-Identify the Research Questions -Source Data -Analyse Data -Interpret and Report Results -Business Decision Making-The Art of Data Science: Volume, Velocity, Variety

**Unit 3: Decision making data and information** Decision making Functions of Management -Planning -Organizing and coordinating Leading and motivating -Controlling process -Informed decision - Decision Making Within the Organization -Operational or transactional -Tactical decision -Strategic decisions - Types of Decision -Programmed decision -Non programmed decision

**Unit 4 : Data and information** Source of data -Internal Sources of Data -External Sources of Data- Primary and Secondary Data-The Problems of Using Secondary Data-Sources of Secondary Data - collection data - Direct observation -Direct inspection-Written questionnaire Personal interviewing- Abstraction from record or published statistics

**Unit 5 : Sampling and sampling designs** Populations and samples – why sample? -Practically-Time-Cost-Errors-DestructiveSmall population-Accuracy-The selection of a sample-Random Sampling-Completeness - Accuracy -Random Sample Designs -simple random sample design -stratified random sampling -systematic sample design -multi-stage sample design -cluster sampling design - Non Random Sample Designs- Quota sampling Judgmental sampling -Statistical Investigations and Surveys-information requirement for effective decision making -quality of information Exploring data deriving information Storing and structuring data -The organization of data-Tabulation -The interpretation of tables-Designing a table-ordering data ranking - Stem – and- leaf-frequency distribution-Grouped frequency distribution Cumulative frequency distribution-Percentiles -Relative and percentage -frequencies - Presenting information pictorially-Charts and diagrams to display category data pictograms-bar charts – simple, compound and component-pie charts -Construction of charts and diagram -Interpretation of charts and diagrams Diagrams to display non category data - The histogram -Frequency polygon Cumulative frequency polygon or ogive -Box plot

## **DATA ANALYSIS WITH R**

**UNIT-I: Introduction to R:** Concept of R, Installing R, IDE of R, Getting help from R, Mathematical Operators and Vectors, Assigning Variables, Special Numbers, Logical Vectors, Classes, Different types of numbers, Changing classes, Examining Variables, The workplace, Vectors – Sequences, Lengths, Names, Indexing Vectors, Vector Recycling and Repetition, Matrices and Arrays – Creating Arrays and Matrices, Rows, Columns, Dimensions, Indexing Arrays, Combining Matrices, Array Arithmetic,

**UNIT-II: Lists, Functions, Strings and Factors:** Lists – Creating lists, Automatic and recursive variables, List dimensions and arithmetic, indexing lists, Conversion between vectors and lists, Combining lists, NULL, Pairlists, Data Frames – Creating Data Frames, Indexing Data Frames, Basic Data Frame Manipulation, Environments, Functions – Creating and Calling Functions Passing functions, variable scope, Strings – Constructing and printing strings, Formatting numbers, Special characters, Changing case, Extracting Substrings, Splitting Strings, File paths, Factors – Creating, factor levels, ordered factors, conversion of variables

**UNIT-III: Flow Controls:** Conditional – if and else, Vectorized if, Multiple Selection, Loops – repeat loops, while loops, for loops, Advanced looping – replication, looping over lists, looping over arrays, Multiple – Input Apply, Instant vectorization, Split-Apply-Combine

**UNIT-IV: Statistics with R:** Summarizing data, Calculating relative frequencies, Tabulating Factors and creating contingency tables, Testing categorical variables for independence, Calculating Quantiles of a dataset, Converting data into z-scores, t-test, testing sample proportions, testing normality, comparing means of two samples, testing correlation for significance, Linear regression in R, Logistic Regression in R Clustering with R

**UNIT-V: Packages and Visualization:** Loading packages, search path, libraries and installed packages, installing packages, maintaining packages, Visualization – The three plotting systems, Scatterplots – base graphics, lattice graphics, ggplots, Line Plots, Histograms, Box Plots, Bar Charts, Other plotting packages and systems



## **DATA VISUALIZATION WITH TABLEAU**

**UNIT-I: Introduction to Visualization:** Concept and importance of data visualization, Choosing appropriate visual encodings – ordering of items, number of distinct values, structure of visualization, Positioning - Placement and Proximity, Graphs and Layouts, Colors, Size, Text and Typography, Shape, Lines.

**UNIT-II: Working with Tableau Data Source and Basic Charts:** Introduction to Tableau, connecting to Data Source: Text Files, Excel, Access, other databases, merging multiple data sources, Univariate Charts – Creating tables, bar graphs, pie charts, histograms, line charts, stacked bar graphs, box plots, Showing aggregate measures, Bivariate Charts – Creating tables, scatter plots, swapping rows and columns, adding trend lines, selecting color palettes, using dates

**UNIT III: Fields, Hierarchies & Filters:** Using predefined fields, calculating percentages, applying if-then logic, applying logical functions, showing totals and percentages, discretizing data, manipulating text, aggregate data. Grouping and creating hierarchies in Tableau. Creating and using Filters in Tableau.

**UNIT-IV: Multivariate Charts and Maps:** Facets, area charts, bullet graphs, dual axes charts, Gantt charts, heat maps, Maps – Setting geographical roles, placing marks on map, overlaying demographic data, choropleth maps, polygon shapes, customizing maps

**UNIT-V: Dashboards in Tableau:** Adding title and caption, font size and colors, adding various marks, adding reference lines, using presentation mode, adding annotation, adding drop-down selectors, search box selectors, slider selectors, creating dashboards, creating animated visualizations. Connecting and using Tableau Public Server.

### **Reference Books:**

- The Visual Display of Quantitative Information by Edward Tufte
- Envisioning Information by Edward
- Tufte Visualizing Data by Ben Fry



## WEB ANALYTICS

**Unit I: Introduction to Web Analytics:** Concept of web analytics, Importance and benefits of Web Analytics, Selecting a web analytic tool, Web Metrics – Visits and Visitors, Time on page and Time on site, Bounce Rate, Exit Rate, Conversion rate, Engagement, Attributes of metrics, Strategic elements related to web metrics – diagnosing root cause, leveraging customer reports, macro view of the site's performance

**Unit II: Clickstream Analysis and KPI's:** Understanding the web metrics of a web site, producing web analytics report, Foundational Analytical strategies – Segmentation, Focus on Customer Behaviour, Different Clickstream Analysis, Web analytics challenges, Actionable outcome KPIs, understanding the conversion rates, measuring macro and micro conversions, quantifying economic value, measuring success for non – economic website

**Unit III: Leveraging Qualitative Data, Testing and Experimentation:** Lab Usability Studies, Usability Alternatives, Surveys, Web-enabled emerging user research options, Testing – A/B Testing, Multivariate Testing, Actionable Testing ideas, Controlled Experiments, Creating and Nurturing a testing culture, Competitive Intelligent Analysis – CI data sources, types and secrets, web traffic analysis, search and keyword analysis

**Unit IV: Emerging Analytics:** Social Analytics – Data challenge, content democracy evolution, twitter revolution, analyzing offline customer experiences, analyzing mobile customer experiences, Measuring the success of blogs, Quantifying the impact of Twitter, Analysing performance of videos, Hidden web analytics traps – accuracy or precision, Dealing with data quality, Building action dashboard, Nonline marketing opportunity and multichannel measurement, Behaviour Targeting, Challenges in Online data mining and Predictive Analytics

**Unit V: Principles of an Analyst:** Understanding the context, Comparing KPIs over time, measuring latent conversions, understanding the search analytics, Multitouch Campaign Attribution Analysis, Multichannel Analytics.

### Reference Books:

1. Clifton B., Advanced Web Metrics with Google Analytics, Wiley Publishing, Inc. 2nd ed.
2. Kaushik A., Web Analytics 2.0, The Art of Online Accountability and Science of Customer Centricity, Wiley Publishing, Inc. 1st ed.
3. Sterne J., Web Metrics: Proven methods for measuring web site success, John Wiley and Sons