SRM VALLIAMMAI ENGINEERING COLLEGE

(An Autonomous Institution)

SRM Nagar, Kattankulathur – 603 203

DEPARTMENT OF ARTIFICIAL INTELLIGENCE AND DATA SCIENCE

QUESTION BANK

VIII SEMESTER

1922804 – BUSINESS ANALYTICS

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UNIT 1 - INTRODUCTION TO BUSINESS ANALYTICS

What is Analytics? - Overview of different Analytic Areas-Introduction to Descriptive analytics, Descriptive Statistics, Probability Distributions, Statistics through hypothesis tests, Permutation & Randomization Test

PART – A

Q.No	Question	Competence	Level
1	What is Business Analytics?	Remember	BTL 1
2	Difference between Data Analytics and Data Analysis.	Understand	BTL 2
3	How is data analytics used?	Understand	BTL 2
4	What is the difference between descriptive analytics and diagnostic analytics?	Remember	BTL 1
5	List out the types of analytics.	Remember	BTL 1
6	Define the modality of a distribution.	Remember	BTL 1
7	Differentiate between *data* and *information* with an example.	Remember	BTL 1
8	What is a null hypothesis (H_0)?	Remember	BTL 1
9	Difference between univariate, bivariate and multivariate descriptive statistics.	Understand	BTL 2
10	Compare and contrast descriptive and inferential statistics.	Understand	BTL 2
11	Define *descriptive analytics*.	Remember	BTL 1
12	Give any two examples of descriptive analytics used in business.	Understand	BTL 2
13	Write down the general properties of Probability Distributions.	Remember	BTL 1
14	What are the two types of probability distributions?	Remember	BTL 1
15	Define normal distribution.	Remember	BTL 1
16	Define Probability tables.	Remember	BTL 1
17	Define Probability distribution.	Remember	BTL 1
18	Mention two properties of a normal distribution.	Remember	BTL 1
19	How to test a statistical hypothesis?	Understand	BTL 2
20	What is hypothesis testing?	Remember	BTL 1
21	What is a permutation test?	Remember	BTL 1
22	What is a measure of central tendency? Name any two.	Understand	BTL 2
23	Give one application each of permutation and randomization tests.	Remember	BTL 1
24	Define Parametric and Non-Parametric methods.	Remember	BTL 1

PART-B

Q.No.	Question	Competence	Level
1	Examine the five areas of analytics in detail. (13)	Analyze	BTL 4
2	Explain about Variance ad Standard Deviation. (13)	Evaluate	BTL 5
3	Discuss the different areas of analytics: Descriptive, Predictive, and	Analyze	BTL 4

	Prescriptive analytics. Compare them with suitable real-time examples. (13)		
4	Describe in detail about descriptive statistics and its types. (13)	Analyze	BTL 4
5	Illustrate a Simple Probabilities with cards. Draw a single card from a well shuffled deck of 52 cards. Each card has the same chance of being drawn so we have equally likely outcomes. Find the following probabilities: P(card is red) P(card is a heart) P(card is a red 5) (13)	Apply	BTL 3
6	Illustrate the simple probabilities with a fair Die. Roll a fair die one time. The sample space is $S = \{1, 2, 3, 4, 5, 6\}$. Find the following probabilities. P(roll a four) P(roll an odd number) P(roll a number less than five) (13)	Apply	BTL 3
7	Explain the normal distribution. Discuss its characteristics, (13) empirical rule, and real-world applications.	Apply	BTL 3
8	Explain in detail about Continuous Probability Distributions and how to calculate probabilities for continuous data. (13)	Analyze	BTL 4
9	Explain in detail about Discrete Probability Distributions with an example. (13)	Analyze	BTL 4
10	Explain hypothesis testing in detail. Describe its steps and the (13) decision-making process with examples.	Apply	BTL 3
11	Identify how to find the expected value and standard deviation with examples. (13)	Apply	BTL 3
12	Illustrate the Concept of Continuous Probability distribution. (13)	Apply	BTL 3
13	Write a detailed note on data summarization techniques used in descriptive analytics. Include numerical examples. (13)	Apply	BTL 3
14	Summarize the concept of Non-parametric test and identify its (13) purpose.	Apply	BTL 3
15	Explain in detail about Regression tests and Comparison tests. (13)	Evaluate	BTL 5
16	Discuss the concept of Randomization tests with example of your (13) own	Create	BTL 6
17	Compare permutation tests, randomization tests, and classical (13) hypothesis tests. Discuss when each method is preferred.	Create	BTL 6
PART – C			
1.	Given a dataset with outliers and skewness, *evaluate* whether (15) mean, median, or mode is the most appropriate measure of central tendency. Provide justification with statistical reasoning.	Create	BTL 6
2.	Describe descriptive statistics and its types and each with an example. (15)	Evaluate	BTL 5
3.	Draw a flow chart explain and evaluate the statistical test and its variable types. (15)	Evaluate	BTL 5

4.	*Develop* a permutation-based statistical test to compare the effectiveness of two marketing campaigns. Outline the steps, assumptions, randomization strategy, and how the final inference will be drawn. (15)	Create	BTL 6
5.	*Evaluate* the effectiveness of descriptive analytics in decision-making for a retail company. Suggest scenarios where descriptive statistics alone may fail and justify your reasoning. (15)	Create	BTL 6

UNIT II REGRESSION

Regression: Ordinary Least Squares, Ridge Regression, Lasso Regression, K Nearest Neighbours, Regression &Classification, Logistic Regression, Linear Discriminant Analysis, Quadratic Discriminant analysis, Regression and classification tree, support vector machine.

PART – A

Q.No	Question	Competence	Level
1	Define regression.	Remember	BTL 1
2	What is the purpose of Regression?	Remember	BTL 1
3	How do you interpret a Regression Model?	Understand	BTL 2
4	What advantage does Lasso have over Ridge?	Remember	BTL 1
5	List out the advantages of OLS Regression.	Remember	BTL 1
6	Define Overfitting and under fitting.	Remember	BTL 1
7	Define K-NN algorithm.	Remember	BTL 1
8	Why do we need a K-NN algorithm?	Understand	BTL 2
9	What is Classification in statistics?	Remember	BTL 1
10	Compare and contrast clustering and classification.	Understand	BTL 2
11	Difference between classification and regression algorithm.	Understand	BTL 2
12	Define RMSE.	Remember	BTL 1
13	Define accuracy.	Remember	BTL 1
14	What is Linear Discriminant Analysis?	Remember	BTL 1
15	Is linear discriminant analysis better than linear regression?	Understand	BTL 2
16	State one assumption of LDA.	Remember	BTL 1
17	Is linear discriminant analysis more flexible than quadratic discrimination analysis? Give inference	Understand	BTL 2
18	Give an outline joint probability distribution.	Understand	BTL 2
19	What is a regression tree in machine learning?	Remember	BTL 1
20	What is the difference between a regression and classification tree?	Understand	BTL 2
21	What is Gini impurity?	Remember	BTL 1
22	Define Support Vector Machines and list out its advantages.	Remember	BTL 1
23	What is a margin in SVM?	Remember	BTL 1
24	State the difference between hard margin and soft margin SVM.	Understand	BTL 2

PART-B

Q.No.	Question	Competence	Level
1	Explain in detail about Ordinary Least Squares Regression. (13)	Analyze	BTL 4
2	Discuss in detail about Lasso Regression for Regularization and Model Selection. (13)	Understand	BTL 2

3	Why Lasso can be used for Model Selection , but not Ridge Regression. Analyze. (13)	Analyze	BTL 4
4	Explain about the distance metrics used in K-NN Algorithms and few applications. (13)	Analyze	BTL 4
5	What is predictive analytics? What is the difference between Classification vs Regression. (13)	Analyze	BTL 4
6	Explain in detail the properties and assumptions of LDA. (13)	Analyze	BTL 4
7	Apply KNN classification to a labelled dataset. Describe how (13) distance and choice of *k* affect predictions	Apply	BTL 3
8	Construct and explain in detail how to prepare data for LDA and QDA? List out few applications. (13)	Apply	BTL 3
9	Sketch in detail about the CART algorithm and list out few applications. (13)	Apply	BTL 3
10	Apply LDA for a two-class classification problem and show how linear boundaries are constructed. (13)	Analyze	BTL 4
11	Examine in detail about the types of SVM. (13)	Analyze	BTL 4
12	Sketch the difference between linear and logistic regression. (13)	Apply	BTL 3
13	Compare OLS, Ridge, and Lasso regression in terms of bias, (13) variance, and model complexity.	Apply	BTL 3
14	Write down the steps how SVM works with suitable example. (13)	Create	BTL 6
15	Determine some applications of SVM in detail. (13)	Evaluate	BTL5
16	Compare linear SVM and non-linear SVM. Discuss kernel (13) functions and their impact on classification.	Analyze	BTL4
17	Explain in detail about the types and assumptions of logistic regression. (13)	Evaluate	BTL5

PART – C

1	Describe in detail about Lasso and Ridge Regression. (15)	Evaluate	BTL 5
2	Interpret how to choose the value of k for K-NN (8) algorithm? List out the advantages and disadvantages. (7)	Evaluate	BTL 5
3	A bank wants to classify customers as loan-defaulters. (15) *Evaluate* whether Logistic Regression, LDA, or SVM is the best choice, considering interpretability, accuracy, and dataset characteristics.	Create	BTL 6
4	*Design* a complete classification model using LDA, QDA, and Logistic Regression. Compare their decision boundaries, assumptions, model selection criteria, and create a final recommendation model. (15)	Create	BTL 6
5	*Develop* a hybrid predictive system combining Regression Trees and SVM for a real-world application (e.g., medical diagnosis or stock prediction). Explain model architecture, workflow, and validation approach. (15)	Create	BTL 6

UNIT III CHALLENGES FOR BIG DATA ANALYTICS

Supervised Learning with Regression and Classification techniques- Unsupervised Learning and Challenges for Big Data Analytics- Clustering, Associative RuleMining, Challenges for big data analytics.

PART – A

Q.No.	Question	Competence	Level
1	Define Data Analysis.	Remember	BTL 1
2	What is the difference between regression and supervised learning?	Remember	BTL 1
3	What are the techniques of supervised machine learning?	Remember	BTL 1

4	Define regression and its types.	Remember	BTL 1
5	Give two examples of classification problems.	Remember	BTL 1
6	What is unsupervised learning?	Understand	BTL 2
7	Define clustering.	Remember	BTL 1
8	Mention any two applications of clustering.	Understand	BTL 2
9	How can unlabeled / unsupervised data be used for analytics?	Understand	BTL 2
10	What do you mean by cluster analysis in data analytics?	Remember	BTL 1
11	What are the key considerations in cluster analysis?	Understand	BTL 2
12	Why do business use cluster analysis for market segmentation?	Understand	BTL 2
13	What are the advantages of cluster analysis?	Remember	BTL 1
14	List out the types of clustering algorithms.	Remember	BTL 1
15	What is clustering and list out the features of cluster analysis.	Remember	BTL 1
16	What is hierarchical clustering?	Understand	BTL 2
17	Define big data velocity.	Understand	BTL 2
18	What is the Apriori algorithm?	Understand	BTL 2
19	What are supervised learning labels?	Remember	BTL 1
20	What is the major difference between supervised and unsupervised learning?	Understand	BTL 2
21	Why is big data challenging?	Remember	BTL 1
22	List out some big data challenges and solutions.	Remember	BTL 1
23	What are the challenges and opportunities of big data analytics?	Remember	BTL 1
24	Does big data analytics have uncertainty. Illustrate	Understand	BTL 2

PART-B

Q.No.	Question	Competence	Level
1	Define regression? List out the types of regression and assess characteristics of regression in Data Analysis. (13)	Apply	BTL 3
2	Elaborate in detail about regression evaluation metrics. List out the advantages and disadvantages. (13)	Evaluate	BTL 5
3	Define Classification. Explain Classification Algorithms. (13)	Analyze	BTL 4
4	Apply a classification technique to categorize emails as spam (13) or not spam. Describe the workflow and algorithm selection.	Analyze	BTL 4
5	Analyze how gradient descent help in minimizing the cost function? (13)	Analyze	BTL 4
6	Explain in detail about evaluating a machine learning regression algorithm. (13)	Evaluate	BTL 5
7	Examine in detail about Clustering. (13)	Analyze	BTL 4
8	Describe how Apriori algorithms used in market basket analysis. (13)	Create	BTL 6
9	Apply association rule mining on a retail dataset to discover (13) buying patterns. Explain support, confidence, and lift with sample rules.	Create	BTL 6
10	Discuss the applications of cluster analysis. How does cluster analysis work? (13)	Apply	BTL 3

11	Explain in detail about association rule mining. (13)	Analyze	BTL 4
12	How does Association Rule Learning work? Analyze with a example of your own. (13)	Analyze	BTL 4
13	Formulate how Associative Classification is used in Data Mining and discuss its types. (13)	Create	BTL 6
14	Identify the approaches used in Market Based Analysis. And explain them (13)	Apply	BTL 3
15	Apply supervised and unsupervised methods together to design a hybrid analytics process for business intelligence.(13)	Analyze	BTL4
16	Analyze the major challenges in big data analytics such as scalability, data quality, and heterogeneity. (13)	Analyze	BTL4
17	Examine the benefits of big data for business. (13)	Analyze	BTL4

PART – C

1	*Evaluate* association rule mining for retail analytics. Justify which algorithm (Apriori vs. FP-Growth) is better for high-volume transactions. (15)	Evaluate	BTL5
2	Discuss about the following: (i)Association Rules (8) (ii)Dimensionality Reduction (7)	Create	BTL6
3	Explain in detail about the types of clustering methods. (15)	Evaluate	BTL5
4	*Design* a complete big data analytics pipeline using supervised learning, clustering, and association rule mining for an e-commerce platform. Include data flow and model selection. (15)	Create	BTL6
5	*Develop* a new hybrid framework that combines unsupervised clustering with supervised classification to improve prediction accuracy in large datasets. Explain the architecture and validation strategy. (15)	Evaluate	BTL5

UNIT IV LEARNING TECHNIQUES

Prescriptive analytics Creating data for analytics through designed experiments, creating data for analytics through Active learning, creating data for analytics through Reinforcement learning, Graph Visualization, Data Summaries, Model Checking & Comparison

PART – A

Q.No.	Question	Competence	Level
1	Define prescriptive analytics.	Understand	BTL 2
2	What is the difference between predictive and prescriptive analytics?	Remember	BTL 1
3	What are designed experiments in analytics?	Remember	BTL 1
4	Define factorial experiment.	Remember	BTL 1
5	What is Active Learning?	Understand	BTL 2
6	Mention one application of Active Learning.	Understand	BTL 2
7	What is reinforcement learning?	Understand	BTL 2
8	Define reward function in reinforcement learning.	Understand	BTL 2
9	What is a policy in reinforcement learning?	Remember	BTL 1
10	State the purpose of graph visualization.	Remember	BTL 1
11	What is Reinforcement Learning?	Remember	BTL 1
12	List out the three branches of Machine Learning.	Remember	BTL 1

13	List out the terminologies related to reinforcement learning.	Remember	BTL 1
14	Give an outline on Data Visualizations?	Understand	BTL 2
15	Recall the general types of Visualizations?	Remember	BTL 1
16	State one purpose of model comparison.	Remember	BTL 1
17	What is cross-validation?	Remember	BTL 1
18	Define exploration and exploitation in reinforcement learning.	Understand	BTL 2
19	What is OFAT (One-Factor-at-a-Time) experiment?	Understand	BTL 2
20	What is a model in data analytics?	Remember	BTL 1
21	Interpret the importance of data analytics in decision-making.	Understand	BTL 2
22	What is Data Modeling? Infer its role in decision-making.	Understand	BTL 2
23	Classify the types of Data.	Understand	BTL 2
24	Interpret your view on Conceptual Data Model?	Understand	BTL 2

PART-B

Q.No.	Question	Competence	Level
1	Examine prescriptive analytics and list out few applications. (13)	Analyze	BTL 4
2	Apply prescriptive analytics to a business scenario (inventory or supply chain) and explain how optimization models support decision-making. (13)	Create	BTL 6
3	Inspect Model building approach in predictive analytics and give a brief note on it. (13)	Analyze	BTL 4
4	Analyze prediction of Customer Behavior in Predictive Analytics using sample code. (13)	Analyze	BTL 4
5	Discuss about the approaches of active learning algorithm. (13)	Create	BTL 6
6	Apply reinforcement learning to a real-world task (e.g., robot navigation or stock trading) and explain the role of rewards and policies. (13)	Analyze	BTL 4
7	Evaluate in detail three main scenarios in active learning for query the labels of instances. (13)	Analyze	BTL 4
8	Formulate a technique to implement reinforcement learning algorithms with suitable example. (13)	Create	BTL 6
9	Assess with a suitable example of your own Markov Decision Process. (13)	Evaluate	BTL 5
10	Apply descriptive and graphical summaries to a dataset and explain the insights gained. (13)	Apply	BTL 3
11	Analyze how Reinforcement Learning Works. (13)	Analyze	BTL 4
12	Identify the advantages and disadvantages of data visualizations (13)	Apply	BTL 3
13	Why data visualization is important ?Identify the reason with proper justification. (13)	Apply	BTL 3
14	Explain the different types of visualizations. (13)	Evaluate	BTL 5
15	Use graph visualization to summarize social network data. (13) Explain how graph metrics help identify key nodes.	Apply	BTL 3
16	Define Physical Data Model. Examine the Data Analysis Process. (13)	Analyze	BTL 4
17	Apply Active Learning to a text classification problem and (13) describe how the query strategy improves model training.	Analyze	BTL 4

PART – C

1	Evaluate real-world implementation of prescriptive analytics and tools used. (15)	Evaluate	BTL 5
2	*Evaluate* the effectiveness of designed experiments, Active Learning, and Reinforcement Learning in generating high-quality data for analytics. Provide scenarios where each is most suitable. (15)	Create	BTL 6
3	*Design* a complete prescriptive analytics framework for (15) optimizing hospital resource allocation using reinforcement learning and model comparison techniques. Include workflow and justification.	Create	BTL 6
4	*Develop* a data analytics system that integrates graph (15) visualization, data summaries, and Active Learning to support dynamic decision-making in a financial or retail environment.	Evaluate	BTL 5
5	Assess about the following: a. Conceptual Data Model (8) b. Logical Data Model (7)	Evaluate	BTL 5

UNIT V   CASE STUDY

Web Analytics: Understanding the metrics - Basic & Advanced Web Metrics - Google Analytics: Demo & Hands on- Campaign Analytics - Text Mining.

PART – A

Q.No.	Question	Competence	Level
1	Define Web analytics.	Remember	BTL 1
2	What are user engagement metrics in web analytics?	Remember	BTL 1
3	What is a "session" in web analytics?	Remember	BTL 1
4	Define pageviews.	Remember	BTL 1
5	What is bounce rate?	Understand	BTL 2
6	What are Web Analytics used for?	Remember	BTL 1
7	Define conversion rate.	Remember	BTL 1
8	What are Key Performance Indicators (KPIs)?	Understand	BTL 2
9	Mention two basic metrics used in Google Analytics.	Remember	BTL 1
10	Define average session duration.	Understand	BTL 2
11	What is event tracking?	Understand	BTL 2
12	Define UTM parameters.	Remember	BTL 1
13	What is campaign analytics?	Remember	BTL 1
14	Mention any two types of digital campaigns.	Understand	BTL 2
15	Define text mining.	Understand	BTL 2
16	What is tokenization in text mining?	Understand	BTL 2
17	What is sentiment analysis?	Remember	BTL 1
18	What is click-through rate (CTR)?	Remember	BTL 1
19	Define advanced segment in Google Analytics.	Understand	BTL 2
20	What is funnel visualization?	Understand	BTL 2
21	Define conversion rate.	Understand	BTL 2
22	What are Key Performance Indicators (KPIs)?	Remember	BTL 1
23	Mention two basic metrics used in Google Analytics.	Remember	BTL 1
24	Define average session duration.	Understand	BTL 2

PART-B

Q.No.	Question	Competence	Level

1	Define Web Analytics and analyze the different types of Web Analytics. (13)		Analyze	BTL 4
2	Explain in detail the Web Analytics Tools. (13)		Analyze	BTL 4
3	Identify the risk in Web Analytics and brief about them. (13)		Apply	BTL 3
4	Examine the three types of Web Analytics metrics . (13)		Analyze	BTL 4
5	List out and examine the benefits of Website Analytics. (13)		Analyze	BTL 4
6	Examine in detail about tools offered by Google Analytics solutions. (13)		Analyze	BTL 4
7	Discover the importance of Campaign Analytics. (13)		Analyze	BTL 4
8	Apply advanced Google Analytics features such as goals, events, and funnels to measure conversions. (13)		Analyze	BTL 4
9	Apply campaign analytics to evaluate the performance of an email campaign. Show metrics and interpretation. (13)		Create	BTL 6
10	How to write a Campaign Analysis and how often do we need to measure marketing campaigns? Give your inference. (13)		Analyze	BTL 4
11	Why do we need to analyze and assess our Campaigns? (13)		Analyze	BTL 4
12	Use keyword frequency, word clouds, and sentiment scores to summarize textual data from a product website. (13)		Apply	BTL 3
13	Examine in detail about how to review our marketing campaign objectives and KPIs in detail with neat diagram. (13)		Analyze	BTL 4
14	Explain in detail about smart insights RACE Planning Framework. (13)		Evaluate	BTL 5
15	Analyze different text mining techniques such as stemming, lemmatization, and topic modelling. (13)		Evaluate	BTL 5
16	Differentiate between text mining, text analysis and text analytics. (13)		Analyze	BTL 4
17	Analyze the role of web analytics in improving website design, user engagement, and content strategy. (13)		Apply	BTL 3
PART - C				
1	*Evaluate* Google Analytics as a tool for business decision-making. Discuss strengths, limitations, accuracy issues, and privacy concerns. (15)		Create	BTL 6
2	*Evaluate* multiple digital campaigns (social media, email, PPC) using advanced metrics. Justify which campaign performed best and why. (15)		Evaluate	BTL5
3	Explain in detail about key steps to create useful Marketing Campaign Analytics. (15)		Evaluate	BTL5
4	*Design* a complete web analytics dashboard for an e-commerce company integrating traffic metrics, conversion metrics, and campaign metrics. Explain components and workflow. (15)		Create	BTL 6
5	*Develop* an end-to-end text mining–based insight system for analyzing customer feedback on a brand's website. Include preprocessing, modelling, visualization, and decision-support steps. (15)		Evaluate	BTL5