**Business Analytics**

**Jun 2025 Examination**

**PLEASE NOTE: This assignment is application based, you have to apply what you have learnt in this subject into real life scenario. You will find most of the information through internet search and the remaining from your common sense. None of the answers appear directly in the textbook chapters but are based on the content in the chapter**

**Q1. Given a dataset with missing values, apply appropriate data treatment techniques to handle the missing data. Justify your choice of method based on the nature of the dataset. Additionally, analyze a real-world scenario where missing data impacts decision-making, and implement suitable imputation methods to improve data quality**

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| **Student\_I D** | **Name** | **Age** | **Gender** | **Math\_Scor e** | **English\_Scor e** | **Attendance**  **(%)** |
| **101** | **Aarav** | **20** | **F** | **85** | **88** | **95** |
| **102** | **Bhavya** | **21** | **M** | **78** |  | **88** |
| **103** | **Charan** | **22** | **M** |  | **82** | **92** |
| **104** | **Deepak** |  | **M** | **92** | **91** |  |
| **105** | **Esha** | **20** | **F** | **88** | **85** | **97** |
| **106** | **Farhan** | **21** |  | **76** | **79** | **85** |
| **107** | **Gauri** |  | **F** | **80** | **86** | **90** |
| **108** | **Harshita** | **22** | **F** |  | **90** | **93** |
| **109** | **Ishan** | **23** | **M** | **90** |  | **89** |
| **110** | **Jyoti** | **20** | **F** | **84** | **87** |  |

**(10 Marks)**

## **Ans 1.**

## **Introduction**

## Common across many fields, including business analytics, healthcare, finance, and education, missing data is a challenge. Missing important information could cause erroneous analysis, biassed findings, and bad decision-making. In research, predictive modeling, and strategic planning as well as in data completeness is crucial to guarantee dependability. Data input mistakes, system faults, or respondents not giving all the information can all cause missing values. The kind of the dataset and the importance of the missing values will determine how missing data are handled. Good imputation techniques enable the integrity of the dataset to be restored, therefore guaranteeing correct analysis and significant discoveries. We shall go over

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**Q2A. A pharmaceutical company is testing a new drug for reducing blood pressure. They conduct a clinical trial with two groups: one receiving the drug and the other receiving a placebo. The blood pressure levels are recorded before and after the trial.**

**1. Analyse the components of a two-sample hypothesis test and determine why it is appropriate or not for this study. (1 Mark)**

**2. Given that the obtained p-value is 0.08, break down the decision-making process for rejecting or failing to reject the null hypothesis at a 5% significance level. (1 Mark)**

**3. Examine the potential risks associated with Type I and Type II errors in this study and discuss how they could affect the interpretation of results. (1 Mark)**

**4. The company wants to check whether the drug's effectiveness varies across different age groups (e.g., 30-40, 41-50, 51-60). Analyse whether the Chi- square test of independence is an appropriate test in this scenario. (1 Mark)**

**5. Differentiate between the Chi-square Goodness of Fit test and the Chi-square test of independence, and analyse how each applies to different types of pharmaceutical studies. (1 Mark) (5 Marks)**

**Ans 2A.**

**Introduction**

Clinical trials are essential for evaluating the effectiveness of new drugs. A pharmaceutical company is testing a drug for reducing blood pressure, comparing it with a placebo. Statistical analysis, including hypothesis testing, helps determine if the drug has a significant effect. This study examines hypothesis testing, decision-making based on p-values, error risks, and a

**Q2B. A company wants to predict sales based on advertising expenses using a simple linear regression model. The dataset for 5 months is given below:**

|  |  |  |  |
| --- | --- | --- | --- |
| **Month** | **Advertising Expense (X**  **in Rs 1000s)** | **Actual Sales (Y in**  **Rs 1000s)** | **Predicted Sales ( in**  **Rs 1000s)** |
| **1** | **2** | **4** | **3.8** |
| **2** | **3** | **5** | **5.2** |
| **3** | **5** | **7** | **6.9** |
| **4** | **7** | **10** | **9.5** |
| **5** | **9** | **12** | **11.7** |

**1. Formulate the simple linear regression equation based on the given data.**

**2. Determine the regression coefficients (: Intercept : Slope) and interpret their impact on sales.**

**3. Derive insights from the regression equation, understanding the baseline performance and the impact of advertising expenses on sales.**

**4. Suggest recommendations based on findings, highlighting the effectiveness of advertising expenses.**

**Instructions:**

**- Use Excel to compute the regression equation, coefficients, and R² value.**

**- Paste the Excel output with formulas to demonstrate calculations.**

**- Insights should be based on data from Excel analysis (5 Marks)**

## **Ans 2B.**

## **Introduction**

Advertising plays a crucial role in driving sales, and companies use predictive models to understand its impact. A simple linear regression model helps determine the relationship between advertising expenses and actual sales. Using a dataset covering five months, this analysis formulates the regression equation, determines regression coefficients, interprets their