**Decision Science**

**NMIMS Centre for Distance and Online Education (NCDOE)**

**Internal Assignment Applicable for June 2025 Examination**

**1. Calculate Fisher Ideal Index number**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Commodities** | **Base Year Price (P₀)** | **Base Year Expenditure (E₀)** | **Current Year Price (P₁)** | **Current Year Expenditure (E₁)** |
| **A** | **2** | **40** | **5** | **75** |
| **B** | **4** | **16** | **8** | **40** |
| **C** | **1** | **10** | **2** | **24** |
| **D** | **5** | **25** | **10** | **60** |

**Answer:**

**Introduction:**

The Fisher Ideal Index is a robust statistical measure that is applied in economics to quantify price movements over time. It is a compromise between two popular indices—the Laspeyres Index and the Paasche Index—by applying the geometric mean of both. The index is very useful since it breaks the monopoly of a single type of price index and presents a balanced and neutral measurement. Its usefulness stems from the fact that it more accurately indicates the cost of living or inflation in an economy. Knowledge of price movements between two periods is crucial to policymakers, firms, and scholars since it assists them in taking rational decisions concerning wages, pricing, investment, and economic policies.

For example, if the price of goods and services has doubled within a time frame, that directly affects the purchasing power of money. A consumer, who could earlier purchase a basket of goods with ₹100, will now require ₹200 to purchase the same basket. The change is accurately reflected by the Fisher Ideal Index, by integrating current year and base year data, and gives a more representative view of inflation. In this case, we will be calculating the Fisher Ideal Index of a basket of four commodities based upon the given prices and spending of both the base year and current year.

**Concepts and Application:**

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**Q2 A bag contains 5 white and 3 black balls, 4 balls are successively drawn out and are not replaced. What is the chance that they are taken alternatively of different colours.**

**Answer:**

**Introduction:**

Probability is a part of mathematics that is involved with uncertainty and the chances of various outcomes. One interesting area where probability is applied is the study of randomly drawing objects from a set without replacing them. This is a common situation encountered in numerous real-world problems, like in card games, lotteries, or even in statistical sampling procedures. If objects are drawn without replacing them, the overall count of objects goes down with each extraction, and this makes the computation of probabilities a little more intricate.

In this particular problem, we have a bag with 5 white balls and 3 black balls. Then, 4 balls are drawn one by one from this bag, and after every draw, a ball is not replaced. The problem is to calculate the probability that these 4 balls are drawn in such a manner that white and black are taken one by one without taking the same two colors together in a single draw. Two patterns are possible in alternating fashion: white-black-white-black (W-B-W-B) or black-white-black-white (B-W-B-W) because taking a ball in such a pattern assures that two same colored balls are not positioned next to one another within the draw. This kind of problem involves knowing permutations and combinations and the favorable outcomes vs. total possible outcomes.

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**Q3 (A).**

|  |  |
| --- | --- |
| **Marks** | **No. of Students** |
| **0 – 10** | **10** |
| **10 – 20** | **15** |
| **20 – 30** | **x** |
| **30 – 40** | **30** |
| **40 – 50** | **10** |
| **50 – 60** | **10** |

**Find the missing frequency if N is 100 and median is 30**

**Answer:**

**Introduction:**

In statistics and probability, we are frequently presented with real data where we have to calculate unknown values with the help of known parameters. Such an example is finding a missing frequency from a grouped frequency distribution if the median is known. Moreover, probability problems related to sequential events, such as extracting balls from a bag without putting them back, show us the alteration in likelihood due to prior events. In this explanation, we will solve two such examples. In the first, we will calculate a missing frequency from a grouped frequency distribution by the help of the known median. In the second, we will calculate the probability of extracting balls in an alternating color order without replacing them, providing a simple and logical method.

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**Q3 (B)**

|  |
| --- |
| **Wages (Rs)** |
| **40** |
| **44** |
| **54** |
| **60** |
| **62** |
| **64** |
| **70** |
| **80** |
| **90** |
| **96** |

**Calculate Standard deviation**

**Answer:**

**Introduction:**

The standard deviation is a statistical factor that informs us to what extent a group of values deviates or is dispersed from the average (mean) of data. It gives us an understanding of the uniformity or divergence within a data set. A lower standard deviation indicates the values are nearer to the average, reflecting more uniformity, whereas a larger standard deviation reveals more dispersion. In this discussion, we will compute the standard deviation of a pre-given collection of wages in rupees via step-by-step calculations. Knowledge of standard deviation is crucial in economics, finance, business, and quality assurance to make appropriate decisions.

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