**Decision science**

**September 2022 Examination**

**Q1. Avantika Mattoo working as an analyst in reputed pharmaceutical company wants to invest her money in stocks. Her friends having expertise in stock market investments, suggested her to invest money into ‘Reliance’ and ‘Maruti’ shares. Avantika’s economist on Avantika’s investments. The figures of return on investment as per four different scenarios presented in the table below.**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Payoff**  **(profit**  **within one month on one unit of share in INR)** | **Scenario 1** | **Scenario 2** | **Scenario 3** | **Scenario 4** |
| **Reliance**  **Industry ltd.** | **55** | **43** | **29** | **15** |
| **Maruti** | **26** | **38** | **43** | **51** |

**1) Set up the opportunity loss table.**

**2) Draw the decision tree (Note: You may use any software for making tree diagram, but snapshot of handwritten tree will be unacceptable)**

**3) According to Niharika’s latest research, she has assigned the following probabilities to**

**the four scenarios (states of nature), determine the EMV decision; P(s1) = 0.4 P(s2) = 0.1 P(s3) = 0.3 P(s4) = 0.2.**

**(Note: Do mention the decision based on the analysis clearly in few sentences.)**

**(10 Marks)**

**Ans 1.**

**Introduction:**

The gap between the maximum conceivable revenue for a state of nature and the exact revenue realized for the specific action chosen is characterized as an opportunity loss. In a nutshell, opportunity loss is the loss suffered as a result of failing to take the greatest potential course of action or plan. Opportunity losses are computed independently for each possible condition of nature. Therefore, for any state of nature, compute opportunity loss for the specified plan of events and determine the differential amongst the maximum payoff and payout for every plan of action for that state of nature. The conditional opportunity loss is

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**Q2. From the following data, check the correlation of ‘Migrants person’ (Migration form Urban areas of J & K to another urban areas of J &K) with the below given variables. Write your conclusion with respect to the correlation coefficient and Scatter Diagram**

**Draw the scatter plot (you may use EXCEL, SPSS, Python, R etc.)**

|  |
| --- |
| **Perform the correlation for the following pairs of variables** |
| Migrant person numbers V/s ‘Number of Factory/Workshop/Work shed etc.’ |
| Migrant person number V/s ‘Number of commercial establishments’ |
| Migrant person number V/s ‘Number of towns’ |
| Migrant person number V/s ‘Population per sq. km.’ |

**(Note: no need to calculate correlation coefficient manually, use EXCEL formula, or any other software)**

**(Note regarding the data access: You can copy the data from this pdf document and paste it into your EXCEL workbook; you may have to work on alignment if it is distorted in Excel.)**

**Data for the analysis**

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **Districts** | **Migrant person numbers** | **Number of Factory/ Workshop/ Workshed etc.** | **Number of commercial establishments** | **Number of towns** | **Population per sq. km.** |
| Kupwara | 2667 | 188 | 6571 | 10 | 2212 |
| Badgam | 5370 | 273 | 5552 | 9 | 1996 |
| Leh(Ladakh) | 2621 | 176 | 3898 | 3 | 1902 |
| Kargil | 650 | 61 | 1711 | 1 | 7635 |
| Punch | 2038 | 67 | 3605 | 3 | 1604 |
| Rajouri | 4011 | 236 | 4656 | 4 | 2390 |
| Kathua | 11306 | 504 | 6952 | 6 | 2079 |
| Baramula | 19382 | 663 | 12171 | 7 | 2871 |
| Bandipore | 4866 | 156 | 3258 | 3 | 1317 |
| Srinagar | 94844 | 3575 | 47986 | 5 | 4141 |
| Ganderbal | 3041 | 231 | 2418 | 3 | 1852 |
| Pulwama | 7939 | 257 | 4885 | 5 | 2087 |

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Shupiyan | 1700 | 30 | 1673 | 1 | 3007 |
| Anantnag | 13545 | 919 | 14079 | 12 | 2880 |
| Kulgam | 2621 | 243 | 3902 | 7 | 1619 |
| Doda | 2297 | 76 | 3016 | 2 | 1655 |
| Ramban | 1171 | 41 | 1768 | 3 | 783 |
| Kishtwar | 569 | 45 | 1765 | 1 | 23595 |
| Udhampur | 10873 | 549 | 6795 | 6 | 2475 |
| Reasi | 2085 | 28 | 3677 | 5 | 692 |
| Jammu | 139422 | 2410 | 46539 | 20 | 3034 |
| Samba | 5349 | 685 | 5162 | 6 | 1383 |

**Ans 2.**

**Introduction:**

Correlation coefficients are being used to assess the strength of an association between two variables. The correlation coefficient is a statistical term that aids in the establishment of a relationship among predicted and actual values acquired in a statistical sum. The estimated correlation coefficient shows the closeness of the expected and actual values.

A correlation value of 1 indicates that for every positive rise in one variable, there is a fixed corresponding increment in the other. A correlation coefficient of -1 shows that for every

**Q3a. The number of customers who enter a ‘German’ supermarket-Gandhinagar each hour is ‘normally’ distributed with a mean of 600 and a standard deviation of 200. The supermarket is open 16 hours per day. What is the probability that the total number of customers who enter the supermarket in one day is greater than 10,000? (Note: Show the stepwise calculation and write the interpretation based on the final answer) (5 Marks)**

**Ans. 3(a)**

**Introduction:**

Probability is synonymous with possibility. It also refers to a mathematical branch that deals with the occurrence of a random event. The value ranges from zero to one. It basically indicates the likelihood of anything happening. It expresses the possibility of an event occurring. The probability of all events in a sample space equals to the value one. A probability technique can be used to

**Q 3b. Shree Ganga Taploo University bookstore claims that 50% of its customers are satisfied with the service and prices.**

**If this claim is true, what is the probability that in a random sample of 600 customers less than 45% are satisfied with services and price?**

**(Note: Show the stepwise calculation and write the interpretation based on the final answer) (5 Marks)**

**Ans 3b.**

**Introduction:**

The term "probability" refers to the likelihood of a specific event (or group of events) occurring, represented on a linear scale from 0 (impossibility) to 1 (certainty), as well as as a percentage between 0 and 100 percent. Statistics is the study of occurrences guided by probability. The more common understanding of probability is that it is merely a measure of