## ISLAMIAH COLLEGE (AUTONOMOUS)



## LAB MANUAL

ALLIED MATHEMATICAL STATISTICS PRACTICAL - II

## U8PYAP41 / U8CHAP42

For the Candidates admitted from the academic year 2018-2019

> By

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# U8PYAP42 / U8CHAP42 ALLIEDMATHEMATICAL STATISTICS PRACTICAL - II 

2 Hours / Week

## List of Exercises

1. Coefficient of correlation, Rank correlation.
2. Multipe Correlation
3. Partial Correlation.
4. Regression equations.
5. $\psi^{2}$ test of independence of attributes ( $2 \times 2$ contingency table only)
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Ex. No. 1 Coefficient of correlation, Rank correlation.

## Date:

1. Calculate the correlation coefficient for the following heights in inches of father $x$ and the son (y)

| X | 65 | 66 | 67 | 67 | 68 | 69 | 70 | 72 |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| Y | 67 | 68 | 65 | 68 | 72 | 72 | 69 | 71 |

Aim:

Procedure:

Result:
2. Calculate the karlpearson coefficient if correlation from the following data.

| Marks in <br> accountancy | 48 | 35 | 17 | 23 | 47 |
| :--- | :---: | :---: | :---: | :---: | :---: |
| Marks in statistics | 45 | 20 | 40 | 25 | 45 |

Aim:

Procedure:

Result:
3. A sample of 10father and their eldest sons give the following data about their height in inches

| Father | 65 | 63 | 67 | 64 | 68 | 62 | 70 | 66 | 71 | 69 |
| :--- | :--- | :--- | :--- | :--- | :--- | :--- | :--- | :--- | :--- | :--- |
| Son | 68 | 66 | 65 | 69 | 71 | 67 | 63 | 70 | 62 | 64 |

Aim:

Procedure:

Result:
4. Find the rank correlation coefficient for the following data:

| X | 68 | 64 | 75 | 50 | 64 | 80 | 75 | 40 | 55 | 64 |
| :---: | :--- | :--- | :--- | :--- | :--- | :--- | :--- | :--- | :--- | :--- |
| Y | 62 | 58 | 68 | 45 | 81 | 60 | 68 | 48 | 50 | 70 |

Aim:

Procedure:
5. The following data give the expressions of machine operators and the performance ratings are given below:

| Experience | 16 | 12 | 18 | 4 | 3 | 10 | 5 | 12 |
| :--- | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| Performance <br> ratings | 87 | 88 | 89 | 68 | 78 | 80 | 75 | 83 |

Calculate the correlation coefficient.

Aim:

## Procedure:

6. Ten competitors in a beauty contest are ranked by three judges as follows

| Judges | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| A | 6 | 5 | 3 | 10 | 2 | 4 | 9 | 7 | 8 | 1 |
| B | 5 | 8 | 4 | 7 | 10 | 2 | 1 | 6 | 9 | 3 |
| C | 4 | 9 | 8 | 1 | 2 | 3 | 10 | 5 | 7 | 6 |

Aim:

Procedure:

Result:

## Ex. No. 2Multipe Correlation

## Date:

1. The following zero-order correlation coefficients are given $r_{12}=0.98, r_{13}=0.44$ and $r_{23}=0.54$.
Calculate multiple correlation treating first variable as dependent and second and third variables as independent.

Aim:

Procedure:

Result:
2. Calculate $R_{1 \cdot 23}, R_{3 \cdot 12}$ and $R_{2 \cdot 13}$ for the following data:

| $\bar{X}_{1}=6.8$ | $\bar{X}_{2}=7.0$ | $\bar{X}_{3}=7.4$ |
| :---: | :---: | :---: |
| $S_{1}=1.0$ | $S_{2}=0.8$ | $S_{3}=0.9$ |
| $r_{12}=0.6$ | $r_{13}=0.7$ | $r_{23}=0.65$ |

Aim:

## Procedure:

Result:
3. If $r_{12}=0.9, r_{13}=0.75$ and $r_{23}=0.7$ find the multiple correlation.

Aim:

Procedure:

Result:
4. The simple correlation coefficients between temperature $\left(X_{1}\right)$, corn yield $\left(X_{2}\right)$ and rainfall $\left(X_{3}\right)$ are If $r_{12}=0.59, r_{13}=$ 0.46 and $r_{23}=0.77$. Calculate the multiple correlations.

Aim:

Procedure:

Result:
5. If $r_{12}=0.863, r_{13}=0.648$ and $r_{23}=0.709$, find the multiple correlation.

Aim:

Procedure:

Result:

Ex. No. 3Partial Correlation.

## Date:

1. In a trivariate distribution $\sigma_{1}=2, \sigma_{2}=3, \sigma_{3}=3, r_{12}=0.7$, $r_{23}=r_{31}=0.5$. Find the partial correlation.

Aim:

Procedure:

Result:
2. The correlation between a general intelligence test and school achievement in a group of children from 6 to 15 years old is 0.80 . The correlation between the general intelligence test and age in the same group is 0.70 . The correlation between school achievement and age is 0.60 . What is the correlation between general intelligence and school achievement in children of the same age?

Aim:

Procedure:

Result:
3. The correlation between a general intelligence test and school achievement in a group of children from 8 to 14 years old is 0.80 . The correlation between the general intelligence test and age in the same group is 0.70 . The correlation between school achievement and age is 0.60 . What is the correlation between general intelligence and school achievement in children of the same age?

Aim:

Procedure:

Result:
4. If $r_{12}=0.9, r_{13}=0.75$ and $r_{23}=0.7$ find the multiple correlation.

Aim:

Procedure:

Result:
5. If $r_{12}=0.863, r_{13}=0.648$ and $r_{23}=0.709$, find the multiple correlation.

Aim:

Procedure:

Result:

Ex. No. 4Regression equations

## Date:

1. For the following data:

| X | 60 | 62 | 65 | 70 | 72 | 48 | 53 | 73 | 65 | 82 |
| :--- | :--- | :--- | :--- | :--- | :--- | :--- | :--- | :--- | :--- | :--- |
| Y | 68 | 60 | 62 | 80 | 85 | 40 | 52 | 62 | 60 | 81 |

Calculate the regression equation of X on Y .

Aim:

Procedure:
2. Find two regression equations for the following two series, what is most likely value of X when $\mathrm{Y}=20$ and likely value of Y when $\mathrm{X}=22$

| X | 35 | 25 | 29 | 31 | 27 | 24 | 33 | 36 |
| :--- | :--- | :--- | :--- | :--- | :--- | :--- | :--- | :--- |
| Y | 23 | 27 | 26 | 21 | 24 | 20 | 29 | 30 |

Aim:

## Procedure:

Result:
3. Estimate (a) sale for advertising expenditure of Rs. 100 lakhs and (b) the advertisement expenditure for sales of Rs. 47 crores from the data given below.

| Sales Rs.(crores) | 14 | 16 | 18 | 20 | 24 | 30 | 32 |
| :--- | :--- | :--- | :--- | :--- | :--- | :--- | :--- |
| Eexpendure (Rs.lakhs) | 52 | 62 | 65 | 70 | 76 | 80 | 78 |

Aim:

## Procedure:

4. A sample of 10 father and their eldest sons give the following data about their height in inches

| Father $(\mathrm{x})$ | 65 | 63 | 67 | 64 | 68 | 62 | 70 | 66 | 71 | 69 |
| :--- | :--- | :--- | :--- | :--- | :--- | :--- | :--- | :--- | :--- | :--- |
| Son $(\mathrm{y})$ | 68 | 66 | 65 | 69 | 71 | 67 | 63 | 70 | 62 | 64 |

Calculate the regression equation of $x$ on $y$.

Aim:

## Procedure:

5. Obtain the regression line for the following data:

| X | 68 | 64 | 75 | 50 | 64 | 80 | 75 | 40 | 55 | 64 |
| :--- | :--- | :--- | :--- | :--- | :--- | :--- | :--- | :--- | :--- | :--- |
| Y | 62 | 58 | 68 | 45 | 81 | 60 | 68 | 48 | 50 | 70 |

Aim:

Procedure:

Ex. No. $5 \psi^{2}$ test of independence of attributes ( $2 \times 2$ contingency table only)

Date:

1. Given the following data, test whether there is any association between economic conditions and intelligence

| Economic condition | Intelligence |  |
| :---: | :---: | :---: |
|  | Good | Bad |
| Rich | 85 | 75 |
| Poor | 165 | 175 |

Aim:

Procedure:

Result:
2. In an anti malarial campaign in a certain area, the data are given below

| Treatment | Fever | No Fever |
| :---: | :---: | :---: |
| Quinine | 20 | 792 |
| No Quinine | 220 | 2216 |

Discuss the usefulness of quinine in checking malaria.

Aim:

Procedure:

Result:
3. Based on information on 1,000 randomly selected fields about the tenancy status of the cultivation of these this fields and use of fertilizers, collected in an agro-economic survey the following classification was noted:

|  | Owned | Rented | Total |
| :--- | :--- | :--- | :--- |
| Using <br> fertilizers | 416 | 184 | 600 |
| Not Using <br> fertilizers | 64 | 336 | 400 |
| Total | 480 | 520 | 1,000 |

Would you conclude that owner cultivators are more inclined towards the use of fertilizers at $5 \%$ level?
Carry out Chi-square test as per testing procedure.

Aim:

Procedure:

Result:
4. In an experiment on immunization of cattle from tuberculosis, the following results were obtained

|  | Affected | Not affected |
| :---: | :---: | :---: |
| Inoculated | 12 | 26 |
| Not Inoculated | 16 | 6 |

Use $\chi^{2}$ test and discuss the effect of vaccine in controlling susceptibility to tuberculosis ( $5 \%$ value of $\chi^{2}$ for one degree of freedom $=3.84$ ).

Aim:

Procedure:

Result:
5. From the data given below about the treatment of 250 patients suffering from a disease, state whether the new treatment is superior to the conventional treatment

| Treatment | No. of patients |  | Total |
| :---: | :---: | :---: | :---: |
|  | Favourable | Not Favourable |  |
| New | 140 | 30 | 170 |
| Conventional | 60 | 20 | 80 |
| Total | 200 | 50 | 250 |

( $5 \%$ value of $\chi^{2}$ for one degree of freedom $=3.84$ ).

Aim:

Procedure:

Result:

