## DAM-003-2014018    Seat No. _____

# B. Sc. (Sem.-IV) Examination

## April - 2022

## Statistics

## Faculty Code : 003

## Subject Code : 2014018

Time : Hours]                                    [Total Marks : **70**

1  (A)  Give the answer of following questions :                          **4**
   (1)  If $r_{xy} = +1$, it shows _____ Correlation.
   (2)  The formula for probable error with usual notation is _____.
   (3)  The quantity $r^2$ is known as _____.
   (4)  When data is in the form of rank, _____ correlation coefficient is used.

1  (B)  Write any one :                                                   **2**
   (1)  Write the properties of correlation coefficient.
   (2)  Write notes on Spearmen's rank correlation method.

1  (C)  Write any one :                                                   **3**
   (1)  Using following data, find Karl Pearson's correlation coefficient.

| Reading Hours | 25 | 38 | 30 | 28 | 34 | 40 | 36 |
|---|---|---|---|---|---|---|---|
| Marks | 65 | 75 | 68 | 70 | 72 | 79 | 75 |

   (2)  Ten students selected from various schools of a district were ranked on the basis of their proficiency in Sports and General knowledge. The rank correlation coefficient obtained from the data was found to be 0.2. Later on, it was noticed that the difference in the ranks of the two attributes for one the students was taken as 3 instead of 2. Find the correct value of rank correlation coefficient.

1  (D)  Write any one :                                                   **5**
   (1)  To study the relationship between the sales and the profit of a company, the following information is obtained for the last six years.

   $n = 6, \Sigma x = 58, \Sigma y = 40, \Sigma xy = 431, \Sigma x^2 = 606, \Sigma y^2 = 316$.

   Find correlation coefficient. Also find coefficient of determination and interpret it.

(2) Using following data find rank correlation coefficient.

| X | 78 | 36 | 98 | 25 | 75 | 82 | 90 | 62 |
|---|----|----|----|----|----|----|----|----|
| Y | 84 | 51 | 91 | 60 | 68 | 62 | 86 | 55 |

**2  (A)  Give the answer of following question**                    4
(1) If the regression coefficient

$b_{YX} > 1$, then $b_{XY} <$ _____ .

(2) If r = 0, the two lines of regression are at an angle of _____ .

(3) Regression Coefficient y on x denoted by _____

(4) If there are perfect positive correlation between x and y then if $b_{yx} = 5$ then $b_{xy} =$ _____ .

**2  (B)  Write any one :**                                          2
(1) State and prove any two properties of regression of coefficient.

(2) Find Yole's coefficient of association and interpret it from the following data :
$N = 400, (B) = 250, (\alpha) = 100, (\alpha\beta) = 70$

**2  (C)  Write any one :**                                          3
(1) Write the difference between correlation coeficient and regression coefficient.

(2) Write notes on association of attributes.

**2  (D)  Write any one :**                                          5
(1) In order to study the relationship between the repairing time of accident damaged cars and the cost of repair, the following information is collected.

| Repairing time | 32 | 40 | 25 | 29 | 35 | 43 |
|----------------|----|----|----|----|----|----|
| Repairing cost | 25 | 35 | 18 | 22 | 28 | 46 |

Obtain the regession line of Y (repairing cost) on X (repairing time). If the time to repair a car is 50 hours, find an estimate of the repairing cost.

(2) The information of a price (in Rs.) of a ballpen and the supply of ballpen (in units). At the end of each month of a year for a company making ballpen is given below. Estimate the supply of ballpen when its prices 40 Rs.

| Detail | Price(x) | Supply(y) |
|--------|----------|-----------|
| Average | 30 | 500 |
| Variance | 25 | 10,000 |
| r = 0.8 | | |

**3** **(A)** Give the answer of following questions :      **4**
     (1) Type I error denoted by _____.
     (2) Parameter is an unknown value of _____.
     (3) If sample small then n is less than _____.
     (4) Type II error is denoted by_____.

**3** **(B)** Write any one :      **2**
     (1) Explain Type I error.
     (2) Write note on t-test.

**3** **(C)** Write any one :      **3**
     (1) An Automatic machine is set to fill 170 tablets in a bottle. A sample of 10 bottles was examined and the number of tablets in them were 168, 164, 166, 167, 168, 169, 170, 170, 171, 170. Test whether the machine is set properly or not.
     (2) The coin is tossed 5 times and if more then 3 times head obtained then $H_0$ is rejected. Find the probability of type I and type II error.

**3** **(D)** Write any one :      **5**
     (1) The following information is obtained for two samples drawn from two normal populations.

| Sample | Size | Mean | S.D. |
|--------|------|------|------|
| I | 10 | 12 | 3.162 |
| II | 12 | 15 | 5.115 |

     Test the hypothesis that the population variances are equal. (F tab=3.03).

     (2) The sales data of an item in six shops before and after a special promotion campaign are as under.

| Shops | A | B | C | D | E | F |
|-------|---|---|---|---|---|---|
| Before Campaign | 53 | 28 | 32 | 48 | 50 | 42 |
| After Compaign | 58 | 32 | 30 | 50 | 56 | 45 |

     Can the campaign be judged as success ? Test at 5% level of significance.

**4** **(A)** Give the answer of following questions :      **4**
     (1) If Sample is large then n is greater than _____.
     (2) If $H_0 : \mu = \mu_0 \ V/S \ H_1 : \mu \neq \mu_o$ then it is known as _____ tail test.
     (3) Formula of Standard error of mean is _____.
     (4) Precision of a statistic is _____.

4 (B) Write any one :                                                         2
   (1) Write notes on Critical region.
   (2) The average life of 150 electric bulbs of a Company
       A is 1400 hours with a S.D. of 120 hours, while
       the average life of 200 electric bulbs of company
       B is 1200 hours with a S.D. of 80 hours. Is
       difference between the average lives of the bulbs
       significant ?

4 (C) Write any one :                                                         3
   (1) A sample of 400 students have a mean height of
       171.38 cms. Can it be reasonably regarded as a
       random sample from a large population with mean
       height 171.17 and standard deviation 3.3 cms ?
   (2) In a certain city 380 men out of 800 men were
       found to be smokers. Discuss whether this
       information support the view that the majority of
       men in the city are smokers.

4 (D) Write any one :                                                         5
   (1) In a hospital out of 500 new born babies, 280 are
       boys. Does this information support the hypothesis
       that the births of boys and girls are in equal
       proportion ? (Test at 1% level of significance).
   (2) The following information is about the heights of
       students of two colleges.

|                   | College A | College B |
|-------------------|-----------|-----------|
| Mean(in inches)   | 67.42     | 67.25     |
| S.D. (in inches)  | 2.58      | 2.50      |
| Sample size       | 1000      | 1200      |

   Is the difference in the means significant ?

5 (A) Give the answer of following questions                                  4
   (1) Chi-Square $(\chi^2)$ distribution was discovered
       by_____.
   (2) Range of Chi-square $(\chi^2)$ is from _____to _____.
   (3) _____ Statistician has given correction.
   (4) The value of coefficient of contingency lies between
       _____and _____.

5  (B)  Write any one :                                                 2
    (1)  Write limitations of Chi-square ($\chi^2$) test.
    (2)  The units produced by a plant are classified into
         four grades. The past performance of the plant
         shows that the respective proportions are 8:4:2:1.
         To check the run of the plant 600 parts were
         examined and classified as follows. Is there any
         evidence of a change in production standards ?

| Grade | First | Second | Third | Fourth | Total |
|-------|-------|--------|-------|--------|-------|
| Units | 340   | 130    | 100   | 30     | 600   |

5  (C)  Write any one :                                                 3
    (1)  A die is thrown for 300 times and the following
         distribution is obtained. Can the die be regarded
         unbiased ?

| Number on the die | 1 | 2 | 3 | 4 | 5 | 6 |
|-------------------|---|---|---|---|---|---|
| Frequency | 41 | 44 | 49 | 53 | 57 | 56 |

    (2)  From the following data use $\chi^2$ test and conclude
         whether inoculation is effective in preventing
         tuberculosis.

|                | Attacked | Not attacked | Total |
|----------------|----------|--------------|-------|
| Inoculated     | 31       | 469          | 500   |
| Not inoculated | 185      | 1315         | 1500  |
| Total          | 216      | 1784         | 2000  |

5  (D)  Write any one :                                                 5
    (1)  The following table gives the number of accounting
         clerks committing errors among trained and
         untrained clerks working in an organization.

|           | Number of clerks committing errors | Number of clerks not committing errors | Total |
|-----------|------------------------------------|----------------------------------------|-------|
| Trained   | 70                                 | 530                                    | 600   |
| Untrained | 155                                | 745                                    | 900   |
| Total     | 225                                | 1275                                   | 1500  |

         Test the effectiveness of training in preventing
         errors.
    (2)  Ten observations drawn randomly from a normal
         population are given below : 68, 72, 68, 74, 77,
         61, 63, 69, 73, 75
         Test the hypothesis that the population variance
         is 32.