B. Sc. (Sem. IV) (CBCS) Examination

March / April - 2018

Statistics : Paper - 401

(Old Course)

Faculty Code : 003

Subject Code : 001422

Time : $2\frac{1}{2}$ Hours]   [Total Marks : **70**

Instructions : (1)   Que. 1 carry 20 marks.

(2)   Que No. 2 and carries 25 marks 3 each.

(3)   Right hand side figures show mark of that question.

(4)   Statistical table and Graph paper will be provided on request.

(5)   Student can use own Scientific Calculator.

1   Filling the blanks : (Each 1 mark)   **20**

(1)   The functional relationship of a dependent variable with independent variable(s) is called _____

(2)   The independent variables in a regression equation are often called _____ variables.

(3)   The regression coefficient b_{YX} is the _____ of the regression line.

(4)   If the regression coefficient $b_{YX} > 1$, then b_{XY} _____

(5)   The two regression lines for the variables X and Y intersect at the point _____

(6)   The quantity r^2 is known as _____

(7)   The estimated value of β_0 in the regression line is $Y = a + b_1 X$ is _____.

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

(9) If $(AB) = \dfrac{(A)(B)}{N}$ then A and B are said to be _____

(10) If Yule's coefficient $Q = 0$, the coefficient colligation $\gamma =$ _____

(11) A hypothesis contrary to null hypothesis is known as _____ hypothesis.

(12) Statistics$-t$ for the test of $H_O : \rho = 0$ based on n pair values has _____ degrees of freedom.

(13) Accepting H_0 when H_0 is false is _____ error.

(14) A null hypothesis is rejected if the value of a test statistics lies in the _____

(15) The number of independent values in a set of values is known as _____

(16) The size of a test is equal to the area of the _____

(17) Equality of two population variances can be test by _____

(18) The test statistics _____ in case of one-tailed and two-tailed test.

(19) The equality of two population correlation coefficients can be tested with the help of _____ transformation.

(20) Whether a test is one-sided or two-sided depends on _____ hypothesis.

2 (A) Give the answer : (Any **Three**)   6

   (1) Define : Probable Error of correlation coefficient.

   (2) Define : Parameter, Statistic

   (3) Write the statement of Central Limit theorem

   (4) Define : Critical Value

   (5) Find coefficient of correlation from following data:

   $$\Sigma (x - \bar{x})^2 = 132, \Sigma (y - \bar{y})^2 = 56, n = 8,$$
   $$\Sigma (x - \bar{x})(y - \bar{y}) = 84$$

   (6) Decide the type of association between attributes A and B from the following data :

   $$N = 210, (A) = 60, (\beta) = 140, (AB) = 20$$

(B) Give the answer : (Any **Three**)   9

    (1) Explain Scatter diagram method.

    (2) State the properties of regression of coefficient.

    (3) Write require steps : Test of significance of Single proportion for large sample.

    (4) Write require steps : Test of significance of difference between two standard deviations for large sample.

    (5) The sum of squares of differences in ranks for two variable 33, and the coefficient of rank correlation is 0.8. Find the number of pair of observations.

    (6) A machine is designed to produce insulating washers for electrical of average thickness of 0.025 cms. A random sample of 10 washers was found to have an average thickness of 0.024 cms. with a standard deviation of 0.02 cms. Test the significance of the deviation.

(C) Give the answer : (Any **Two**)   10

    (1) Prove that, correlation coefficient is independent of change of origin and scale.

    (2) Explain Type-I and Type-II error.

    (3) Prove that angle between two lines of regression

       is $\theta = \tan^{-1}\left\{\dfrac{1-r^2}{r}\left(\dfrac{\sigma_x \sigma_y}{\sigma_x^2 + \sigma_y^2}\right)\right\}$

    (4) Prove that for 2×2 contingence table

       $\aleph^2 = \dfrac{N(ad-bc)^2}{(a+b)(b+d)(a+c)(c+d)}$ *where*
       $N = a+b+c+d$

    (5) The two regression lines are $x+2y-5=0$, $2x+3y-8=0$ and $S_x^2 = 12$, find $\bar{x}, \bar{y}, S_y^2$ and r.

3 (A) Give the answer : (Any **Three**)   6

    (1) Define : Correlation

    (2) Prove that $r = \pm\sqrt{b_{yx} \times b_{xy}}$

    (3) Define: Null hypothesis

(4) Write the statement of Law of large number

(5) If $\bar{x} = 169, \bar{y} = 67, S_x = 20, S_y = 3$ and $r = 0.5$ then find regression line of Y on X.

(6) In a sample of 100 items 10 are found to be defective. Find 95% confidence limit for the population proportion of defective item.

(B) Give the answer : (Any **Three**)   9

(1) Why two lines of regression?

(2) Explain Critical Region.

(3) Explain Sampling Distribution of Statistics.

(4) Write require steps: Test of significance of difference between two means for large sample.

(5) Find Yule's coefficient of association from following data and give your comments :

$$N = 170, (A) = 80, (\beta) = 120, (\alpha B) = 20$$

(6) In a large city A, 20% of a random sample of 900 school boys had defective eye-sight. In another large city B, 15.5% of a random sample of 1600 school boys had the same defect. Is the difference between two proportions significant.

(C) Give the answer : (Any **Two**)   10

(1) Prove that $-1 \leq r \leq 1$

(2) Write the difference between correlation coefficient and regression coefficient.

(3) Write Short note: Standard error of statistics.

(4) For $2 \times r$ contingence table prove that,

$$\aleph^2 = \sum w_i (p_i - p)^2 \; Where,$$

$$p_i = \frac{a_i}{n_i}, p = \frac{a}{n}, q_i = (1 - p_i), w_i = \frac{n_i}{pq}, q = \frac{b}{n}, q = 1 - p$$

(5) A correlation coefficient of 0.5 from a sample of 19 pairs of observations. Can the sample be regarded as drawn from a bivariate normal population in which true correlation is 0.3 ?