



**NBA-003-001422** Seat No. \_\_\_\_\_

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

**March / April - 2017**

**Statistics : Paper - 401**

*(Statistical Methods)*

*(New Course)*

**Faculty Code : 003**

**Subject Code : 001422**

Time :  $2\frac{1}{2}$  Hours]

[Total Marks : 70

- Instructions :**
- (1) Question-1 carries 20 marks.
  - (2) Question-2 & 3 carries 25 marks each.
  - (3) Right hand side figures shows marks of that question.
  - (4) Statistical tables and graphs will be provided on request.
  - (5) Students can use own scientific calculator.

**1** Answer the following questions : **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) A regression model in which residual terms is not involved, called a \_\_\_\_\_.
- (4) The idea of correlation was given by \_\_\_\_\_.
- (5) The quantity  $r^2$  is known as \_\_\_\_\_.
- (6) The formula for probable error with usual notation is \_\_\_\_\_.
- (7) If two attributes  $A$  and  $B$  are completely associated, the value of Yuel's coefficient  $Q$  is equal to \_\_\_\_\_.
- (8) The hypothesis  $H_o : \theta > \theta_0$  is a \_\_\_\_\_ hypothesis.
- (9) Probability of first kind of error is called the \_\_\_\_\_ of the test.

- (10) Accepting  $H_0$  when  $H_0$  is false is \_\_\_\_\_ error.
- (11) If  $\beta$  is the probability of type II error, the power of the test is \_\_\_\_\_.
- (12) Equality of two population variances can be test by \_\_\_\_\_.
- (13) Degree of freedom in a test takes care of the \_\_\_\_\_.
- (14) Critical region is also known as region of \_\_\_\_\_.
- (15) The regression coefficient  $b_{YX}$  is the \_\_\_\_\_ of the regression line.
- (16) The original of correlation coefficient lies in \_\_\_\_\_ distribution.
- (17) If the two lines of regression are perpendicular to each other, then the relation between regression coefficients is \_\_\_\_\_.
- (18) The test statistic for testing the significance of correlation coefficient  $r$  is \_\_\_\_\_.
- (19) The equality of two population correlation coefficients can be tested with the help of \_\_\_\_\_ transformation.
- (20) If the difference in sample means of two groups  $A$  and  $B$  of size 12 each is 5.42 units and the standard deviation of mean difference is 2 units to test the significance of mean difference, you would prefer to apply \_\_\_\_\_.

2 (A) Answer the following questions : (Any three)

6

- (1) Prove that  $b_{yx}$ ,  $b_{xy}$  and  $r$  have always same sign.
- (2) Define: Correlation
- (3) Prove that  $r = \pm \sqrt{b_{yx} \times b_{xy}}$
- (4) Write the statement of Central Limit theorem
- (5) Write the statement of Law of large number
- (6) Find the Yuel's coefficient of association from the following data

$$N = 170; (A) = 80; (\beta) = 120; (a\beta) = 20$$

(B) Answer the following questions : (Any three)

9

- (1) Write the properties of t-test.
- (2) Write the difference between large sample test and small sample test.
- (3) Explain Critical Region.
- (4) Why two lines of regression?
- (5) Find equation of regression line of  $y$  on  $x$  from the following data

	$x$	$y$
<i>Mean</i>	20	25
<i>S.D.</i>	4	12
<i>Cov(x, y)</i>	43.2	

- (6) The correlation coefficient between two variables  $x$  and  $y$  is 0.5 and the co-variance between them is 40. If the variance of  $x$  is 25, find standard deviation of  $y$ .

(C) Answer the following questions : (Any two)

10

- (1) Write Short note: Standard error of statistics
- (2) Explain Type-I and Type-II error.
- (3) Prove that  $-1 \leq r \leq 1$
- (4) Prove that for  $2 \times 2$  contingency table

$$\chi^2 = \frac{N(ad-bc)^2}{(a+b)(b+d)(a+c)(c+d)} \text{ where}$$

$$N = a + b + c + d$$

- (5) Two random samples of size 9 and 7 respectively are drawn from two different populations. The means of the samples are 196.4 and 198.8 respectively. The sum of the squares of deviations from their respective means is 26.94 and 18.73. Test the hypothesis that population means are equal.

- 3 (A) Answer the following questions : (Any **three**) 6
- (1) Define: Null hypothesis
  - (2) Define: Regression
  - (3) Write the statement of Law of Statistical Regularity
  - (4) Define: Parameter, Statistic
  - (5) If  $n(n^2 - 1) = 1320$  and  $\sum d^2 = 165$ , then find Spearman's rank correlation coefficient.
  - (6) Decide the type of association between attributes A and B from the following data:  
 $(A) = 40, (B) = 70, N = 100, (AB) = 30$

- (B) Answer the following questions : (Any **three**) 9
- (1) Explain Sampling Distribution of Statistics.
  - (2) Explain Scatter diagram method.
  - (3) Regression co-efficient are independents of change of origin but not scale.
  - (4) Find coefficient of colligation  
 $N = 2000, (A) = 260, (\beta) = 1720, (AB) = 100$
  - (5) The sum of square of difference in ranks for two variables is 33, and the coefficient of rank correlation is 0.8. Find the number of pairs of observation.
  - (6) The correlation coefficient between two variables  $x$  and  $y$  is 0.5 and the co-variance between them is 40. If the variance of  $x$  is 25, find standard deviation of  $y$ .

- (C) Answer the following questions : (Any **two**) 10
- (1) Prove that, correlation coefficient is independent of change of origin and scale.
  - (2) Discuss different types of association
  - (3) Write the required steps for test of significance of a mean for large sample test.
  - (4) Explain One tail test and Two tail test.
  - (5) For  $2 \times r$  contingency table Prove that,  

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

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