

**FOURTH SEMESTER B.Sc. DEGREE EXAMINATION, APRIL 2017**

(CUCBCSS-UG)

Complementary Course

MBY 4C 15—BIOSTATISTICS—II

Time : Three Hours

Maximum : 64 Marks

*Use of Calculator is permitted.***Part A***Answer all questions.**Each question carries ½ mark.*

Fill in the blanks (Questions 1–4) :

1. Fixed value of size of a test is known as \_\_\_\_\_.
2. Equality of variances of two normal populations can be tested by \_\_\_\_\_ test.
3. Correlation coefficient is \_\_\_\_\_ between regression coefficients.
4. Degrees of freedom for chi-square statistic in cases of  $5 \times 4$  contingency table is \_\_\_\_\_.

Choose the correct answer (Questions 5–8) :

5. In an ANOVA table, if total sum of squares is 258 with degrees of freedom 19 and sum of square between sample is 50 with degrees of freedom 3, the mean error sum of squares is \_\_\_\_\_.  
(a) 12. (b) 13.  
(c) 16. (d) 18.
6. The chi-square test for goodness of fit was developed by :  
(a) C. R. Rao. (b) R.A. Fisher.  
(c) W.S. Gosset. (d) Karl Pearson.
7. The correlation coefficient is independent of \_\_\_\_\_.  
(a) Change of scale only. (b) Change of origin only.  
(c) Both changes of origin and scale. (d) Neither changes of scale nor origin.
8. In multiple correlation analysis, the number of variables is at least :  
(a) 2. (b) 3.  
(c) 5. (d) None of the above.

Turn over

State True or false (Question 9-12) :

9. The hypothesis  $H_0 : 0 > 10$  is a composite hypothesis
10. Area of critical region depends on size of Type II error
11. Range of a chi-square statistic is from 0 to 1.
12. In case of a perfect correlation, the two regression lines coincide.

(12 × ½ = 6 marks)

### Part B (Short Answer Type Questions)

Answer **all** questions.

Each question carries 2 marks.

13. Define null and alternative hypothesis.
14. Point out the difference between one tailed test and two tailed test.
15. State the basic assumptions in ANOVA technique.
16. Define regression coefficients.
17. What is multiple correlation ? Give an example.
18. Define attributes. What contingency table ?
19. Distinguish between critical region and region of acceptance in testing of Statistical hypothesis.
20. What are the components of total variations in one way analysis of variance ?
21. The regression lines are  $3X + 2Y - 26 = 0$  and  $6X + Y - 31 = 0$ . Find the mean values of X and Y.
22. What are the basic assumptions in regression analysis ?

(10 × 2 = 20 marks)

### Part C (Short Essay)

Answer **any six** questions.

Each question carries 3 marks.

23. What are Type I and Type II errors in testing of hypothesis ? Define size of a test.
24. Explain Chi-square test of goodness of fit.
25. Describe the test for significance of regression.
26. If  $r_{12} = 0.9$ ,  $r_{13} = 0.75$ ,  $r_{23} = 0.7$ , compute  $R_{1.23}$ .
27. The lines of regression in a bivariate population are :  
 $8X - 10Y + 66 = 0$  and  $40X - 18Y = 214$ .

Find the correlation between X and Y and standard deviation of Y.

28. Write down the model and analysis of variance table for one way layout dealing with homogeneity of data relative to  $k$  grounds.
29. What do you mean by independent of attributes ? Write down the formula for Chi-square statistic in cases of  $2 \times 2$  contingency table under the independence of attributes.
30. A random of 27 pairs of observations from a normal population gave a correlation coefficient of 0.6. Is the significance of correlation in the population ?

(6 × 3 = 18 marks)

**Part D (Essays)**

*Answer any two questions.*

*Each question carries 10 marks.*

31. (i) What are critical values and level of significance ? Write down the critical values for one tailed and two tailed tests at 5% level for large sample tests.
- (ii) Explain the procedure of testing of statistical hypothesis.
- (iii) In a cross between red flowered and the white flowered plants, it was found that of the 452 flowers obtained 119 were white and the rest red. Is this consistent with the hypothesis that red and white flowers in the ratio 3 : 1 ?

(Given  $\chi_{0.05}^2$  for degrees of freedom 1, 3 and 5 are respectively 3.84, 5.99 and 7.81)

32. (i) Explain the uses and characteristics of partial correlation coefficient.
- (ii) If  $r_{12} = 0.8$ ,  $r_{13} = 0.4$ ,  $r_{23} = 0.56$ , compute the partial correlation coefficients  $r_{12.3}$  and  $r_{23.1}$ .
33. (i) Explain the analysis of variance technique for two way classified data with one observation per cell.
- (ii) Explain the concept of regression and its uses. What are regression lines ? Why there are two regression lines ?

(2 × 10 = 20 marks)